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RCRA FACILITY ASSESSMENT SAMPLING VISIT WORK PLAN SOLID WASTE MANAGEMENT UNITS 47, 53 AND 55 (SWMU47) (SWMU53) (SWMU55) NS MAYPORT FL
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RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) FACILITY ASSESSMENT SAMPLING VISIT WORKPLAN

SOLID WASTE MANAGEMENT UNITS 47, 53, AND 55

U. S. NAVAL STATION MAYPORT MAYPORT, FLORIDA

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:

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PROFESSIONAL GEOLOGIST CERTIFICATION

This document, *Resource Conservation and Recovery Act Facility Assessment Sampling Visit Work Plan for Solid Waste Management Units 47, 53, and 55* Naval Station Mayport, Mayport, Florida, has been prepared under the direction of a Florida Registered Professional Geologist. The work and professional opinions rendered in this report were conducted or developed in accordance with commonly accepted procedures consistent with applicable standards of practice. This document was prepared for U.S. Naval Station Mayport, Mayport, Florida, and should not be construed to apply to any other site.

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FOREWORD

To meet its mission objectives, the U.S. Navy performs a variety of operations, some requiring the use, handling, storage, or disposal of hazardous materials. Through accidental spills and leaks and conventional methods of past disposal, hazardous materials may have entered the environment in ways unacceptable by today's standards. With growing knowledge of the long-term effects of hazardous materials on the environment, the Department of Defense initiated various programs to investigate and remediate conditions related to suspected past releases of hazardous materials at their facilities.

One of these programs is the Installation Restoration (IR) program. This program complies with the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act. The acts, passed by Congress in 1980 and 1986, respectively, established the means to assess and cleanup hazardous waste sites for both private-sector and Federal facilities. These acts are the basis for what is commonly known as the Superfund program.

Originally, the Navy's part of this program was called the Navy Assessment and Control of Installation Pollutants (NACIP) program. Early reports reflect the NACIP process and terminology. The Navy eventually adapted the program structure and terminology of the IR program.

The IR program is conducted in the following stages.

- The preliminary assessment (PA) identifies potential sites through record searches and interviews.
- A site inspection (SI) then confirms which areas contain contamination, constituting actual "sites." (Together, the PA and SI steps were called the Initial Assessment Study [IAS] under the NACIP program.)
- Next, the remedial investigation and the feasibility study (RI/FS) together determine the type and extent of contamination, establish criteria for cleanup, and identify and evaluate any necessary remedial action alternatives and their costs. As part of the RI/FS, a risk assessment identifies potential effects on human health or the environment to help evaluate remedial action alternatives.
- The selected alternative is planned and conducted in the remedial design and remedial action stages. Monitoring then ensures the effectiveness of the effort.
- A second program to address present hazardous material management is the Resource Conservation and Recovery Act (RCRA) Corrective Action Program. This program is designed to identify and cleanup releases of hazardous substances at RCRA-permitted facilities. RCRA is the law that

ensures solid and hazardous wastes are managed in an environmentally sound manner. The law applies primarily to facilities that generate or handle hazardous waste.

- This program is conducted in three stages.
- The RCRA facility assessment (confirmatory sampling) identifies solid waste management units (SWMUs), evaluates the potential for releases of contaminants, and determines the need for future investigations.
- The RCRA facility investigation then determines the nature, extent, and fate of contaminant releases.
- The corrective measures study identifies and recommends measures to correct the release.

The hazardous waste investigations at Naval Station Mayport are presently being conducted under the RCRA Corrective Action Program. Earlier preliminary investigations had been conducted at Naval Station Mayport under the NACIP program and IR program following Superfund guidelines. In 1988, in coordination with the U.S. Environmental Protection Agency (U.S. EPA) Region IV and the Florida Department of Environmental Regulation (now the Florida Department of Environmental Protection [FDEP]), the hazardous waste investigations were formalized under the RCRA program.

Mayport is conducting the cleanup at their facility by working through the Southern Division, Naval Facilities Engineering Command. The U.S. EPA and the FDEP oversee the Navy environmental program. All aspects of the program are conducted in compliance with State and Federal regulations, as ensured by the participation of these regulatory agencies.

Questions regarding the RCRA program at Naval Station Mayport should be addressed to Ms. Adrienne Wilson, Code 1852, at (843) 820-5582.

EXECUTIVE SUMMARY

The original workplan for these SWMUs and other Group IV sites was written by ABB Environmental Services, Inc.(ABB-ES) and finalized in November 1995 (ABB-ES, 1995a). This workplan incorporates the information presented in that document and revises it.

This Resource Conservation and Recovery Act (RCRA) Facility Assessment Revised Sampling Visit (RFA SV) Workplan (confirmatory sampling) is prepared to address the sampling activities at the Group IV solid waste management units (SWMUs) 47, 53, and 55 in accordance with the RCRA Corrective Action Program at U.S. Naval Station Mayport as described in the Corrective Action Management Plan (CAMP). The original CAMP is located in Appendix F of Volume I of the RCRA Facility Investigation (RFI) Workplan (ABB Environmental Services, Inc., 1991), and the current CAMP was approved in March 1998. The Group IV SWMUs requiring confirmatory sampling addressed in this RFA SV Workplan are:

- SWMU 47, Oily Waste Collection System;
- SWMU 53, Sewer Pipelines; and
- SWMU 55, Storm Sewer and Drainage System.

The purpose of RFA SV sampling activities is to confirm whether or not contaminant releases have occurred. Releases of contaminants to the environment are suspected but not confirmed at SWMUs 47, 53, and 55, and confirmatory sampling is proposed for these SWMUs.

This RFA revised SV Workplan proposes sampling techniques and locations to collect environmental samples from suspected affected media (sediment, soil, and groundwater) and analytical methods to confirm releases of contaminants to the environment. The analytical methods will address contaminants selected from the 40 Code of Federal Regulations (CFR) Part 264, Appendix IX groundwater monitoring list and the U.S. Environmental Protection Agency (U.S. EPA) Contract Laboratory Program (CLP) target compound and target analyte lists. Analytical methods will include U.S. EPA Method 8240 for volatile organic compounds (VOCs), Method 8270 for semivolatile organic compounds (SVOCs), Method 8080 for chlorinated pesticides and polychlorinated biphenyls, and Methods 6010, 7420, 7470, and 9010 for inorganics.

Quality control and quality assurance, project organization, and health and safety protocols will follow the specifications described in the approved RFI Workplan, as appropriate.

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ACRONYMS

ABB-ES	ABB Environmental Services, Inc.
ADD	average daily dose
AIMD	Aircraft Intermediate Maintenance Department
AMI	Atlantic Marine, Inc.
AOC	area of concern
ARARs	applicable or relevant and appropriate requirements
ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
bls	below land surface
CAMP	corrective action management plan
CAR	contamination assessment report
CARA	contamination assessment report addendum
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CPCs	contaminants of potential concern
CVAA	cold vapor atomic adsorption
DFM	diesel fuel, marine
DPT	direct-push technology
DQO	data quality objective
DRF	Discharge Reporting Form
DRMO	Defense Reutilization and Marketing Office
ECD	Electron Capture Detector
ER-L	effects range-low
ER-M	effects range-median
ESE	Environmental Science and Engineering, Inc.
ESI	expanded site inspection
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FID	flame ionization detector
FFTC	Firefighting Training Center
FTC	Fleet Training Center
GC	gas chromatograph
GC/MS	gas chromatography and mass spectroscopy
GFAA	graphite furnace atomic adsorption
GIR	general information report
GPR	ground penetrating radar
HASP	health and safety plan
HEAST	health effects assessment summary tables
HI	hazard index
HQ	hazard quotient
HSA	hollow-stem augers
HSO	Health and Safety Officer
HSWA	Hazardous and Solid Waste Amendments
IAS	initial assessment study

ICP	inductively coupled plasma
ID	inside diameter
IR	Installation Restoration
IRIS	Integrated Risk Information System
JSI	Jacksonville Shipyard, Inc.
LADD	lifetime average daily dose
mg/kg	milligrams per kilogram
MPT	Mayport
µg/l	micrograms per liter
NACIP	Navy Assessment and Control of Installation Pollutants
NAVSTA	Naval Station
NEESA	Naval Energy and Environmental Support Activity
NFSI	North Florida Shipyard, Inc.
NIRP	Navy Installation Restoration Program
NOEL	no observed effects level
NPDES	National Pollutant Discharge Elimination System
NTU	nephelometric turbidity units
OVA	organic vapor analyzer
OWCS	oil waste collection system
OWTP	oily waste treatment plant
PA	preliminary assessment
PCB	polychlorinated biphenyl
PEL	probable effects level
ppm	parts per million
psi	pounds per square inch
PVC	polyvinyl chloride
PWD	public works department
QA	quality assurance
QAPP	quality assurance program plan
QC	quality control
RAP	remedial action plan
RBC	risk based concentration
RCRA	Resource Conservation and Recovery Act
RFA	RCRA facility assessment
RfDs	reference doses
RFI	RCRA facility investigation
RI/FS	remedial investigation and feasibility study
SCs	screening concentrations
SCAPs	site characterization and analysis penetrometer system
SI	site inspection
SIMA	Shore Intermediate Maintenance Activity
SOUTHNAV-FACENGCOM	Southern Division, Naval Facilities Engineering Command
SMP	site management plan
SSL	soil screening level

SV	sampling visit
SVOCs	semivolatile organic compounds
SWMU	solid waste management unit
TAL	target analyte list
TCL	target compound list
THI	total hazard index
TICs	tentatively identified compounds
TLV	threshold limit value
TM	technical memoranda
UCL	upper confidence limit
USACE	U.S. Army Corps of Engineers
U.S. EPA	U.S. Environmental Protection Agency
VOA	volatile organic analyte
VOC	volatile organic compound
VSI	visual site inspection
WWTF	wastewater treatment facility

1.0 INTRODUCTION

This Work Plan presents the background, approach, and data-gathering procedures for Resource Conservation and Recovery Act (RCRA) investigations of selected solid waste management units (SWMUs) at U.S. Naval Station (NAVSTA) Mayport, Florida. NAVSTA Mayport is located in northeastern Duval County, Florida, at the confluence of the St. Johns River and the Atlantic Ocean, as shown on Figure 1-1 (ABB-ES, 1995a).

1.1 RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) CORRECTIVE ACTION PROGRAM

The U.S. Environmental Protection Agency (U.S. EPA) issued RCRA permit No. H016-118598 and Hazardous and Solid Waste Amendments (HSWA) permit FL9 170 024 260 to NAVSTA Mayport on March 25, 1988. The HSWA permit was revised and reissued on June 15, 1993. A RCRA Facility Assessment (RFA) visual site inspection (VSI) for NAVSTA Mayport was conducted on behalf of the U.S. EPA Region IV by their contractor, A.T. Kearney, Inc. (A.T. Kearney, 1989). The RFA identified 56 SWMUs and 2 areas of concern (AOCs) at NAVSTA Mayport. Eighteen SWMUs were determined to require an RCRA Facility Investigation (RFI) because hazardous substance releases to the environment were confirmed and required further characterization to determine the nature and extent of contamination. Fifteen SWMUs were determined not to require further action because no releases of hazardous substances to the environment had occurred. Twenty-three SWMUs were determined to require further investigation because hazardous substance releases to the environment were suspected but not confirmed. RFA sampling visits (SVs) have been conducted at most of these SWMUs to confirm the presence or absence of a release(s) to the environment (Table 1-1, ABB-ES, 1995a). SWMU 51 consists of petroleum underground storage tanks and appurtenances and is being managed under a different program of RCRA (e.g., 40 Code of Federal Regulations [CFR], Part 280, Subtitle C, Regulation of Underground Storage Tanks).

Due to the number of SWMUs at NAVSTA Mayport, the diversity of their past and/or present operations, and the magnitude of permit requirements, the U.S. EPA recommended that a phased approach be used to implement RFI, RFA SV, and other corrective action activities. A Corrective Action Management Plan (CAMP) was prepared that describes the phased approach, proposed schedule, and strategy to implement the RCRA Corrective Action Program at NAVSTA Mayport. The original CAMP is located in Appendix F of Volume I of the U.S. EPA-approved RFI Workplan (ABB-ES, 1991). The CAMP identifies the operational groups of SWMUs, ranks them by their perceived relative risks to human health and the

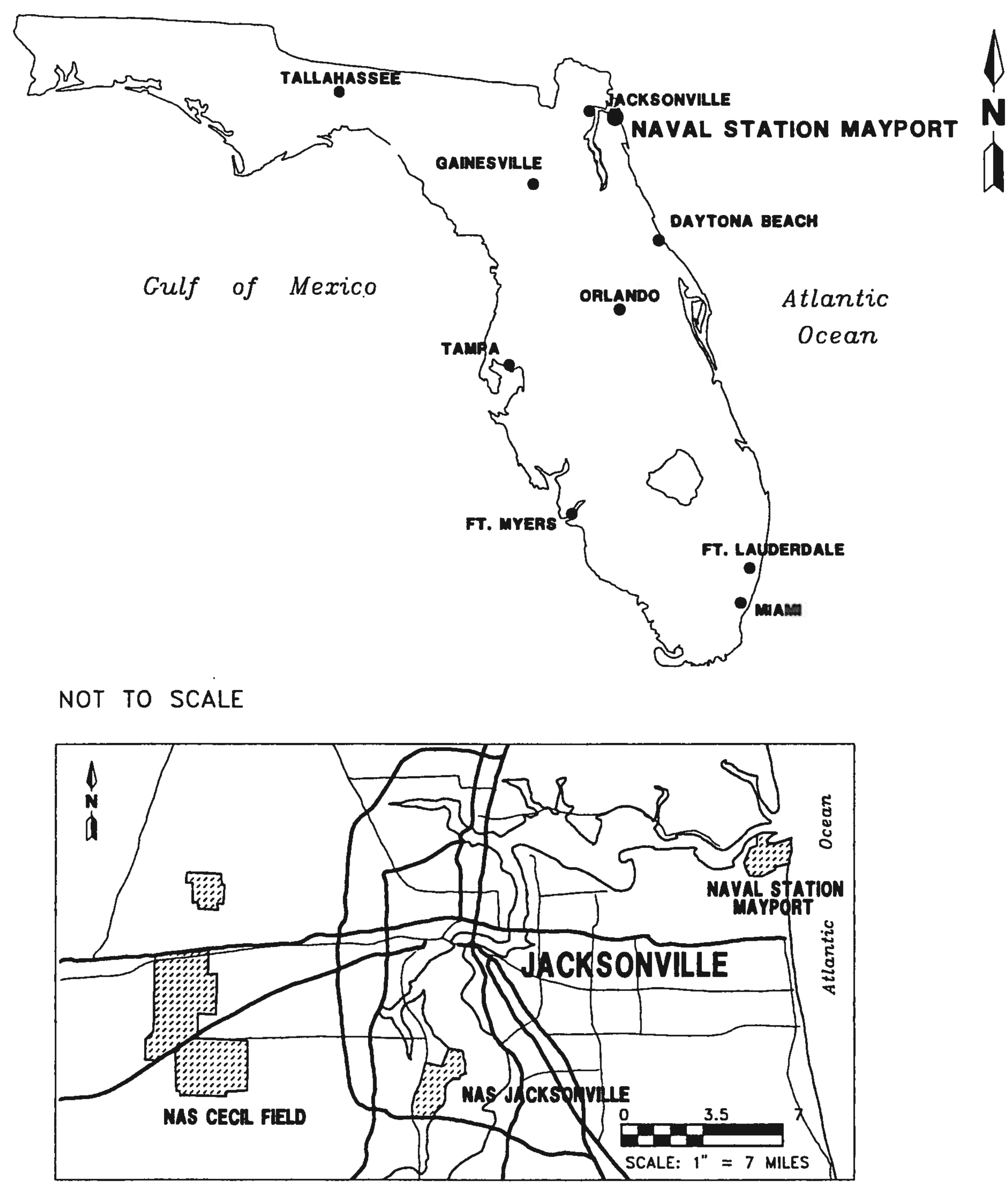

FIGURE 1-1
FACILITY LOCATION MAP

RCRA FACILITY ASSESSMENT WORKPLAN, GROUP IV SWMUs

U.S. NAVAL STATION MAYPORT, FLORIDA

000100/KGP-WDW-GLC-SB/5-5-95

GRP4SWMU.RFA
PMW.10.95

Source: ABB-ES, 1995a.

Table 1-1

Solid Waste Management Units Requiring a Resource Conservation and Recovery Act (RCRA) Facility Assessment Sampling Visit (RFA SV)

RFA SV Workplan, Group IV
U.S. Naval Station
Mayport, Florida

Group I RFA SV Solid Waste Management Units		RFA SV Conducted (Yes/No)
26	Landfill C	Yes
49	Flight Line Retention Ponds	Yes
50	East and West Dredge Spoil Disposal Areas	Yes
56	Building 1552 Accumulation Area	Yes
Group II RFA SV Solid Waste Management Units		**RFA SV Conducted (Yes/No)**
19	Naval Aviation Depot (NADEP) Blasting Area	Yes
28	Defense Reutilization Marketing Office (DRMO) Yard	Yes
48	Former Chemistry Laboratory Accumulation Area	Yes
51	Waste Oil Tanks	No[1]
Group III RFA SV Solid Waste Management Units		**RFA SV Conducted (Yes/No)**
18	Fleet Training Center (FTC) Diesel Generator Sump	Yes
20	Hobby Shop Drain	Yes
21	Hobby Shop Scrap Storage Area	Yes
23	Jacksonville Shipyard, Inc. (JSI), Area	Yes

Table 1-1 (continued)
Solid Waste Management Units Requiring a Resource Conservation and Recovery Act (RCRA) Facility Assessment Sampling Visit (RFA SV)

RFA SV Workplan, Group IV
U.S. Naval Station
Mayport, Florida

24	North Florida Shipyard, Inc. (NFSI), Area	Yes
25	Atlantic Marine, Inc. (AMI), Area	Yes
29	Oily Waste Pipeline Break	No[2]
44	Wastewater Treatment Facility Clarifiers 1 and 2	Yes
45	Sludge Drying Beds	Yes
46	Shore Intermediate Maintenance Activity (SIMA) Engine Drain Sump	No[2]
52	Public Works Department (PWD) Service Station Storage Area	Yes
Group IV RFA SV Solid Waste Management Units		RFA SV Conducted (Yes/No)
47	Oily Waste Collection System	No
53	Sewer Pipelines	No
54	Oil-Water Separators	No[1]
55	Storm Sewer and Drainage System	No
AOC A	Fuel Distribution System	No[1]
AOC B	Underground Product Storage Tanks	No[1,2]

[1] Solid waste management units (SWMUs) 51 and 54 and areas of contamination (AOCs) A and B are managed under Chapter 62-761 (Underground Storage Tank Systems) of the Florida Administrative Code (FAC).
[2] Releases at SWMUs 29 and 46 and AOC B have been investigated under Chapter 62-770 (State Underground Petroleum Environmental Response) FAC.

(Source: ABB-ES, 1995a: revised 1999)

environment, and contains the proposed schedule for the field investigations and report submittals. The CAMP is updated yearly to reflect the most current schedule.

Four SWMU groups are defined in the CAMP and listed in Table 1-1. SWMU Groups I through III are presented on Figure 1-2. (ABB-ES, 1995a) These were defined by grouping individual SWMUs within a geographic area that have similar past waste management practices and the potential for similar corrective measures. Group IV SWMUs are not directly associated within a given geographic area, but consist of utility networks and systems that span multiple geographic areas across NAVSTA Mayport. These are not shown on Figure 1-2 (ABB-ES 1995a). The Group IV SWMUs and AOCs are located throughout the developed part of NAVSTA Mayport. Much of the utility networks to be investigated as part of Group IV are in close proximity to the Turning Basin. The SWMUs to be investigated in this group are related by the fact that they transport wastewater or petroleum-related liquids. The original Group IV SWMUs and AOCs included SWMUs 47, 53, 54, and 55 and AOCs A and B.

Previous investigations under the RCRA Corrective Action Program at NAVSTA Mayport include RFI and RFA SV activities at Groups I and II SWMUs (Figure 1-2, ABB-ES 1995a). Current activities under the RCRA Corrective Action Program include field investigative activities for both the RFI site characteriza tions and RFA SVs at the remaining SWMUs

The RCRA Facility Investigation General Information Report (GIR) for NAVSTA Mayport (ABB-ES, 1995c) provides information common to all four SWMU groups being investigated, including background sampling information and analytical methodology, risk assessment approach, and the ecological characterization of NAVSTA Mayport. The NAVSTA Mayport GIR includes a summary of published information including geography, physiography, demographics, climate, regional geology, and hydrogeology; methods and procedures used to conduct the field activities; methodology used to validate analytical data and conduct risk assessments; and characterization of station-wide background conditions, including surface and subsurface soil, surface water, sediment, and groundwater that will be used to evaluate the data from each RFA SV SWMU. The information contained in the GIR (ABB-ES, 1995c) is common to all of the NAVSTA Mayport SWMUs, and it will not be repeated in this RFA revised SV workplan.

1.2 GROUP IV SWMU AND AOC INVESTIGATIONS

This RFA SV Workplan addresses the following Group IV RFA SV SWMUs:

- SWMU 47, Oily Waste Collection System;
- SWMU 53, Sewer Pipelines; and

- SWMU 55, Storm Sewer and Drainage System.

The purpose of RFA SV sampling activities is to confirm whether or not contaminant releases have occurred. Releases of contaminants to the environment are suspected but not confirmed at SWMUs 47, 53, and 55.

This RFA SV Workplan is intended to serve as a supplemental document to the NAVSTA Mayport RFI Workplan (ABB-ES, 1991) and is consistent with the approved Quality Assurance Program Plan (QAPP) and Health and Safety Plan (HASP). Applicable sections of the RFI Workplan have been referenced in this RFA SV Workplan where appropriate. The RFA SV activities will include testing, assessment, and the collection of soil, groundwater, and sediment samples from SWMUs 47, 53, and 55.

Analytical results of environmental samples will be used to assess whether contaminants are present or potentially have been released from SWMUs 47, 53, and 55. The analytical data also will be used to to determine if a preliminary risk screening of SWMUs 47, 53, and 55 is required. If a preliminary risk screening is done, it will include comparison of the analytical data to relevant background samples and regulatory criteria. Based on the preliminary risk screening, recommendations will be made for additional sampling or conducting an RFI, if necessary, or no further investigation.

In this Workplan, Chapter 2.0 presents SWMU and AOC descriptions, background, location, and planned investigation. Chapter 3.0 presents the analytical program, which includes a discussion of analytes of interest, quality assurance and quality control (QA/QC), and analytical methods. Chapter 4.0 presents the preliminary risk assessment screening methodology to be used in determining what SWMUs will undergo further investigation and what SWMs will be recommended for no further investigation. Chapter 5.0 presents the schedule of the work outlined in this workplan. Chapter 6.0 provides the references for the previously approved investigation derived waste plan. Appendix A presents QA/QC requirements for all aspects of the field program with the exception of the analytical program. Appendix B presents health and safety requirements for the work outlined in this workplan. Appendix C presents SOPs for the field program. Appendix D contains reviewers comments and the responses to them.

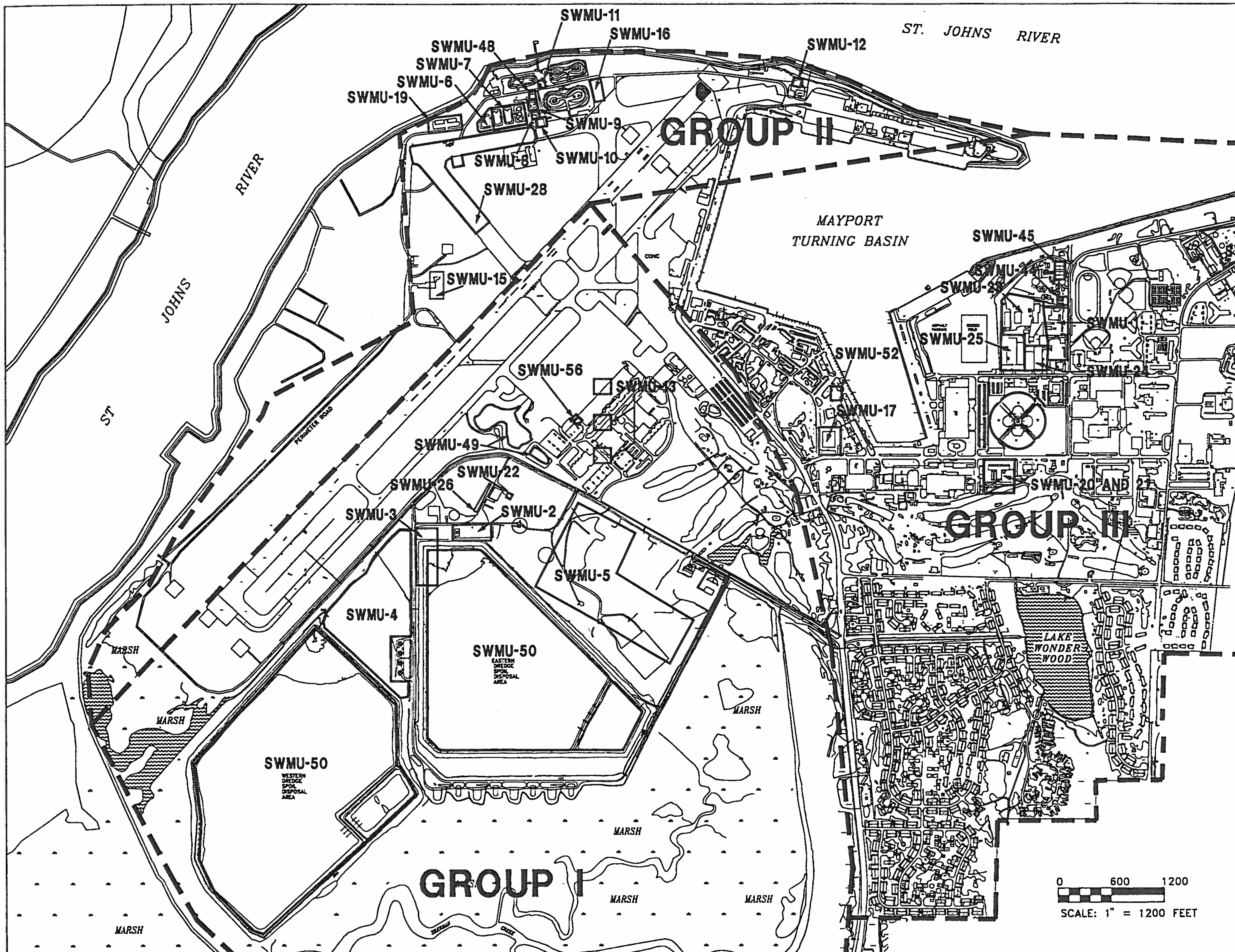

FIGURE 1-2
NAVAL STATION (NAVSTA) MAYPORT RCRA FACILITY INVESTIGATION SOLID WASTE MANAGEMENT UNITS (SWMUs) IN GROUPS I, II, AND III

RCRA FACILITY ASSESSMENT
WORKPLAN, GROUP IV SWMUs

U.S. NAVAL STATION
MAYPORT, FLORIDA

Source: ABB-ES, 1995a.

2.0 TECHNICAL APPROACH

This chapter describes background information, the field sampling activities and standard operating procedures to be conducted for the each SWMU during the RFA SV investigations. Previous documents submitted by ABB-ES contain applicable information for facility investigations. These include: Chapter 2.0, Site Management Plan (SMP), of the RFI workplan, Volume II (ABB-ES, 1991), and Section 3.1, General Site Operations, of the RFI workplan, Volume II. These documents provide descriptions of field personnel responsibilities, sample identification, sample management, chain of custody, project documentation, field changes, corrective actions, decontamination procedures, investigation-derived waste management, general operating guidelines for site access, security, and field team organization and logistics that will be implemented during RFI activities. These guidelines will also be followed during the RFA SV activities. Additionally, Chapter 3.0 of the workplan for AOC C Naval Station Mayport (TtNUS, 1999) contains specific information for investigative activities in the Group IV SWMU area that will be followed during the RFA SV activities. Appendix C of this workplan contains TtNUS SOPs for field activities being conducted during the RFA SV.

Field and laboratory QA/QC requirements for the RFA SV will comply with the QAPP located in Appendix A of this workplan. Health and safety requirements will be in accordance with the site-specific HASP located in Appendix B of this RFA SV workplan.

The environmental samples will be compared to appropriate background samples described in the Technical Memorandum, Background Characterization Activities, report for NAVSTA Mayport (ABB-ES, 1994) and NAVSTA Mayport GIR (ABB-ES, 1995b). The objectives of the data-gathering activities at the RFA SV SWMUs are to generate sufficient data from environmental samples to assess the presence or absence of contamination at the site and to conduct preliminary risk screening. The RFA SV sampling and analytical objectives (confirmatory sampling) do not include characterization of the horizontal and vertical extent of contaminants; if contaminants are present, however, site characterization may be required.

2.1 SOLID WASTE MANAGEMENT UNIT (SWMU) BACKGROUND, FIELD INVESTIGATION AND SAMPLING PROGRAM

This chapter summarizes known background information for each Group IV SWMU and includes site characteristics, past activities, suspected contaminant release scenarios (e.g., types of contaminants, quantities, and affected media), and proposed numbers of environmental samples to be collected. Most of the background information is obtained from a VSI conducted during the RFA by A.T. Kearney, Inc., in 1989.

2.1.1 SWMU 47, Oily Waste Collection System (OWCS)

The oily waste collection system (OWCS) is a system of gravity pipelines, lift stations, and force mains that convey oily bilge water collected from ships at the piers and oily water from operations at the Firefighting Training Center (FFTC) to the oily waste treatment plant (OWTP). The majority of the system was constructed during 1978 to 1980 from ductile iron pipe that is not cathodically protected. Piping at Alpha Pier was replaced in 1991, and Foxtrot Pier was constructed in 1994. The collection system can be broken into two subsystems: the gravity feed system used to convey the oily wastewater (primarily bilge water) from the oily waste risers at the piers to the lift stations, and the lift stations with force main pipelines that convey oily wastes to the Oily Waste Treatment Plant (OWTP) (SWMU 9).

According to the RFA in 1989, the OWCS consists of sewer lines that run parallel to the piers along the Mayport Turning Basin. These sewer lines are the gravity part of the OWCS. The risers that feed the gravity section are located approximately every 50 feet along the length of the entire pier system. The pier system consists of 6 piers designated as the Alpha, Bravo, Charlie, Delta, Echo, and Foxtrot piers as shown on Figure 2-1 (ABB-ES1995a). The gravity sections of the OWCS feed four lift stations. These lift stations pump the oily waste to the OWTP (SWMU 9) through force mains. The locations of the gravity lines and the force mains are also shown on Figure 2-1 (ABB-ES, 1995a).

According to a 1992 evaluation of the OWCS (Hendon, 1992), there are approximately 47 risers around the Mayport Turning Basin that feed the approximately 13,702 linear feet of 6- and 8-inch gravity pipeline. The gravity sewer lines flow to four lift stations that pump the oily waste through approximately 9,960 linear feet of 6-, 8-, and 12-inch diameter force mains. These sewer lines are all believed to be above the water table, and in general, are approximately 6 feet below land surface (bls). Water table elevations will be verified prior to the beginning of field activities.

During interviews with NAVSTA Mayport staff civil engineering personnel, it was noted that in January 1990 the diesel fuel marine (DFM) distribution line was broken during an excavation to repair an adjacent utility line. The base personnel investigating the broken line noted what appeared to be old oily waste product in the excavation area, indicating a previous product release. As a result of this discovery, integrity testing was conducted on the oily waste and fuel pipelines. Because this part of the oily waste pipeline is a gravity system, a dye test was conducted; results did not suggest that the oily waste line was leaking. The testing of the DFM pipeline system as a result of this incident and subsequent periodic pressure testing suggest that no apparent leaks are present.

Prior to 1987, the FFTC effluent discharged directly to the Wastewater Treatment Facility (WWTF). In 1987, the oily wastewater sewer line from the FFTC was connected to the oily waste collection system at Echo Pier to pretreat the oily wastewater prior to discharge to the NAVSTA Mayport WWTF.

Investigation of SWMU 47 was recommended in the RFA (A.T. Kearny, 1989) because of the highly permeable soil, the shallow water table, the proximity of the OWCS to surface water, the age of the system, the lack of testing, and the history of failures. It was suggested that the structural integrity of both the gravity and force main pipeline be tested and, if the integrity of the system has been impaired, that repairs are implemented and the soil adjacent to the repair is sampled to determine whether releases of hazardous compounds have occurred. Further, the RFA report recommended that a program for regular inspection and maintenance be implemented by the facility to prevent and/or detect future potential releases of oily waste. In August 1997, ABB-ES conducted a limited sampling event at the Group IV SWMUs. Surface water, subsurface soil, surface soil, sediment and groundwater samples were collected in the vicinity of the OWCS.

There is no record of the OWCS being completely inspected since its installation. The assessment at SWMU 47, therefore, is intended to thoroughly inspect all the gravity sewer lines and force main sewer lines in the OWCS. There are 47 OWCS risers on the Alpha, Bravo, Charlie, Delta, Echo and Foxtrot piers along Mayport Turning Basin. Each is housed in a low, concrete pillbox (approximately 5 feet long by 3 feet wide) secured by a locked steel door. The door can be opened to reveal the riser, either a 6- or 8-inch diameter flanged pipe, where ships berthed at the pier attach transfer lines. Each of the risers at the piers where ships connect to the system and each of the lift stations will be visually inspected for signs of damage, spills, and leaks.

The 1997 Group IV sampling event conducted by ABB-ES (ABB-ES, 1999) investigated specific areas of concern identified using results of previous pipeline investigations. Exploration locations will be determined based on this these results and the results of the visual inspection. Direct push technology (DPT) sampling or equivalent technology will be used to evaluate whether oily waste has been released to the surrounding soil. Some of these DPT points will become permanent monitoring wells. It is estimated that approximately 75 subsurface soil locations will be investigated, and that approximately 15 permanent monitoring well locations will be installed. These locations may be sampled in conjunction with sampling locations at SWMU 53, the Sewer Pipelines, as these two systems are often coincident. The samples will be sent to an offsite laboratory for the following analyses:

- SW-846 Method 5035/8260 for VOCs and
- SW-846 Method 8270 for (semivolatile organic compounds) SVOCs and
- SW-846 Methods 6010, 7470, 7480, and 9010 for metals and cyanide.

Details on the analytical program are provided in Chapter 3.0.

2.1.2 SWMU 53, Sewer Pipelines

The RFA describes the sewer pipelines as the system that collects and transports wastewater from all areas of the station to the NAVSTA Mayport WWTF (A.T. Kearny, 1989). The WWTF is a National Pollutant Discharge Elimination System (NPDES) permitted facility located to the south of the entrance to the Mayport Turning Basin (Figure 2-2, ABB-ES 1995a). Like the OWCS (SWMU 47), the sewer lines are composed of gravity feed pipelines, lift stations, and force main sewer lines. Table 2-1 lists the length of sewer pipeline by diameter and type (gravity or force) for all of NAVSTA Mayport.

The RFA states that the sewer pipeline transports industrial wastewater and domestic sewage to the WWTF (A.T. Kearny, 1989). The industrial operations that contribute wastewater flow to the WWTF include Shore Intermediate Maintenance Activity (SIMA), Aircraft Intermediate Maintenance Depot (AIMD), helicopter maintenance hangars, commercial shipyards, and the ships berthed in the Mayport Turning Basin. The RFA also states that each part of the system was likely constructed when the associated buildings were constructed, beginning in 1942. Therefore, much of the system was probably constructed in the 1950s when the station was expanded to accommodate more and larger vessels.

The RFA states that wastes that could possibly be discharged through floor drains and sinks by these industrial activities include paint wastes, cleaning compounds, degreasers, foundry cleaning liquids, water from oil-water separators, and effluent from a ship's combined holding tanks (A.T. Kearny, 1989). A WWTF influent sampling study conducted by the U.S. EPA in 1987 identified many hazardous constituents in the influent to the WWTF. Those constituents included chromium, nickel, chloroform, toluene, naphthalene, methyl ethyl ketone, benzene, 1,4-dichlorobenzene, bromoform, and phenols (A.T. Kearny, 1989).

Investigation of SWMU 53 was recommended in the RFA because of the high permeability of the soil at NAVSTA Mayport, the shallow water table, the proximity to surface water, and the potential for release of material to the soil, groundwater, and surface water (A.T. Kearny, 1989). Because some of the sewer lines originate in an industrial setting, it was recommended in the RFA that the sewer pipelines be investigated. It was further suggested that the maintenance and repair procedures for the pipeline be evaluated to determine if they are adequate to ensure that releases from the system are prevented.

In 1988, an evaluation using a remote video camera to view the sewer system was completed by Smith and Gillespie Engineers, and a large number of recommended repairs were identified. Many of the repairs recommended by the inspection were completed. This limits the area to be investigated to the sewers from helicopter maintenance, SIMA, and the sewers along Moale Avenue north of the golf course.

The RFA (A.T. Kearney, 1989) recommended that the structural integrity of the sewer system be evaluated, and, if the structural integrity has been impaired, that appropriate repairs are implemented and soil sampling conducted to determine whether releases of hazardous compounds have occurred. Further, the RFA report recommended that a program for regular inspection and maintenance be implemented by the facility to prevent and/or detect future releases from the sewer system (A.T. Kearny, 1989).

The RFA SV at SWMU 53 will review the records from the most recent video inspection of the sewer system that transport wastewater from the industrial part of the facility. The sewer lines that service only the residential areas of the facility are not expected to contain hazardous constituents; therefore, they will not be included in the RFA SV field program. There are four Sewer Pipeline lift stations where the gravity lines that connect each riser join the force main pipeline. The lift stations consist of below ground concrete vaults that fill with oily waste from the gravity lines. The vault is equipped with a pump. When the lift station sump fills to a specific level, the pump is activated, pumping the oily waste into the force main. Access to the lift station is through a manhole. Each of these lift stations will be visually inspected for signs of damage, spills, and leaks. A catalogue of all wells, utilities, and manholes will also be performed to contribute to the pier management plan.

The 1997 Group IV sampling event conducted by ABB-ES (ABB-ES, 1999) investigated specific areas of concern identified during previous pipeline investigations. Exploration locations will be determined based on this these results and the results of the visual inspection. Direct push technology (DPT) sampling or equivalent technology will be used to evaluate whether hazardous materials have been released to the surrounding soil. Some of these DPT points will become permanent monitoring wells. It is estimated that approximately 75 subsurface soil locations will be investigated, and that approximately 15 permanent monitoring well locations will be installed. These locations may be sampled in conjunction with sampling locations at SWMU 47, OWCS, as these two systems are often coincident. The samples will be sent to an offsite laboratory for the following analyses:

- SW-846 Method 5035/8260 for VOCs, and
- SW-846 Method 8270 for SVOCs, and
- SW-846 Methods 6010, 7470, 7480, and 9010 for metals and cyanide.

Details on the analytical program are provided in Chapter 3.0.

FIGURE 2-1
SOLID WASTE MANAGEMENT UNIT (SWMU) 47,
OILY WASTE COLLECTION SYSTEM

Source: ABB-ES, 1995a.

RCRA FACILITY ASSESSMENT
WORKPLAN, GROUP IV SWMUs

U.S. NAVAL STATION
MAYPORT, FLORIDA

FIGURE 2-2
SOLID WASTE MANAGEMENT UNIT (SWMU) 53, SANITARY SEWERS IN INDUSTRIALIZED AREAS

Source: ABB-ES, 1995a.

RCRA FACILITY ASSESSMENT WORKPLAN, GROUP IV SWMUs

U.S. NAVAL STATION MAYPORT, FLORIDA

Table 2-1
Sewer Pipeline Lengths by Type

RFA SV Workplan, SWMUs 47, 53, and 55
U.S. Naval Station
Mayport, Florida

Pipe Diameter (inches)	Gravity Sewer Line (linear feet)	Force Main (linear feet)	Total (linear feet)
3	0	675	675
4	0	4,540	4,540
6	0	5,545	5,545
8	46,510	5,819	52,329
10	5,747	1,421	7,168
12	548	2,531	3,079
15	2,684	0	2,684
18	231	3,829	4,060
21	2,171	0	2,171
24	2,412	0	2,412
Total	60,303	24,360	84,663

(Source: ABB-ES, 1995a)

2.1.3 SWMU 55, Storm Sewer and Drainage System

The RFA report describes the storm sewer system at NAVSTA Mayport as consisting of underground storm sewer pipes and unlined drainage ditches (A.T. Kearny, 1989). The storm sewer system conveys run-off to the St. Johns River, Sherman Creek, Lake Wonderwood, the Mayport Turning Basin, and the Atlantic Ocean (Figure 2-4). Lake Wonderwood was investigated in 1993 by ABB-ES (ABB-ES, 1996). Many of the storm sewer pipes that discharge to the surrounding surface water are fed by unlined drainage ditches found over the entire facility.

The RFA report states that the flight line retention ponds (SWMU 49), the boiler blowdown at Building 250, and the Hobby Shop Drain (SWMU 20) discharge into the stormwater drainage system. Both the flight line retention ponds and the hobby shop drain have been investigated in previous RFA confirmatory sampling efforts. The unlined drainage ditch system that runs throughout the base is a possible recipient of any uncontrolled spills of hazardous material and leaks from underground systems such as the OWCS (SWMU 47) or the oil-water separators (SWMU 54) (A.T. Kearny, 1989). The 1989 RFA report included as an example a report of a long-term intermittent discharge of an oily material from a stormwater outfall in the Alpha pier area thought to be from a fuel-line leak (SWMU 29). This problem was assessed under Chapter 62-770, Florida Administrative Code (FAC) (State Underground Petroleum Environmental Response), regulations on petroleum contamination with the Florida Department of Environmental Protection (FDEP) providing oversight.

The RFA recommended further investigation of the storm sewer and drainage system due to the highly permeable soil at NAVSTA Mayport, the shallow groundwater table, and the fact that the stormwater discharges directly to surface water. In addition, the drainage system was indicated as possibly containing hazardous constituents discharged to it in the industrial areas of the facility (A.T. Kearny, 1989). The RFA recommended a program of surface water and sediment sampling in the drainage ditches and the discharge points from both the storm sewer pipes and the drainage ditches.

At the time of the RFA, no inventory of the storm sewers existed; however, an inventory of the storm sewer system was completed in 1994 as part of the Storm Water Pollution Prevention Plan by Ogden Environmental and Energy Services (Ogden, 1994).

The RFA for SWMU 55 is intended to investigate whether contaminants are present in the drainageways as a result of discharges to surface runoff from the industrial areas. A visual inspection of the stormwater ditches will be conducted, and outfalls from the sewer system will be photographed. If the outfall has not been previously identified, a sediment/surface soil sample will be collected. The drainage ditches that drain the helicopter maintenance areas have been sampled in previous investigations. The data from this sampling effort will be used for this investigation.

The 1989 RFA (A. T. Kearney, 1989) suggested a program of surface water and sediment sampling in the unlined drainage ditches to identify whether significant levels of contaminants have accumulated in the system. The Group IV RFA SV sampling focus will be the unlined drainage ditches and outfalls from the industrial areas of the station (Figure 2-3, ABB-ES, 1995a). At each sampling location, at least one surface soil or sediment sample will be collected from the stormwater drainageway. Surface water samples will be collected if standing water is present at the sampling locations. The sampling locations will be determined through visual inspection of the drainageway. The sample will be taken at a low point in the drainage way; e.g., a low spot associated with the start of the concrete conveyance. If, however, the stormwater is collected from concrete or asphalt covered areas only, no surface soil or sediment sample will be collected for that outfall. Most of the concrete conveyance pipelines are used to convey stormwater under the pier areas and into the Mayport Turning Basin. An estimated 20 surface water and 20 sediment samples will be collected and submitted to an offsite laboratory for the following analyses:

- SW-846 Method 5035/8260 for VOCs,
- SW-846 Method 8270 for SVOCs, and
- SW-846 Method 8081A for organochlorine pesticides, and
- SW-836 Method 8082 for polychlorinated biphenyls (PCBs)
- SW-846 methods 6010, 7470, 7480, and 9010 for metals and cyanide.

If contamination is discovered in the surface soil or sediment samples, ecological toxicity testing may be required to assess whether the location will be further investigated under an RFI. Details of the Analtyical Program can be found in Chapter 3.0. If ecological testing is conducted, the methods and results will be evaluated as described in Section 4.0.

2.2 VISUAL INSPECTIONS OF PIPELINES

As noted above, several components of the OWCS, the Sewer Pipeline, and the Storm Sewer Drainage System, will be visually inspected for signs of damage, spills, and leaks. Each component will also be photographed.

- Each of the 47 OWCS risers will be identified by its established unique identification code (e.g. "Riser A-1-1," denoting the first riser at Alpha Pier, proceeding sequentially in a clockwise direction).
- Each of the four Sewer Pipeline lift stations will be identified by its established unique identification code.

FIGURE 2-3

SOLID WASTE MANAGEMENT UNIT (SWMU) 55, STORM SEWERS IN INDUSTRIALIZED AREAS

Source: ABB-ES, 1995a.

RCRA FACILITY ASSESSMENT WORKPLAN, GROUP IV SWMUs

U.S. NAVAL STATION MAYPORT, FLORIDA

- All monitoring wells, utilities, and manholes related to the sewer lines will be catalogued for use in the Pier Management Plan.
- Each outfall in the Storm Sewer and Drainage System will be identified using its established unique identification code.
- Detailed location notes, with sketch map and distance measurements of each component, will be prepared and entered into the field logbook.
- Any observations that may indicate leakage or the potential for leakage, such as a cracked pipe, dysfunctional fitting, cracked pavement, oil staining in or around the riser, or odor in surrounding soil, will be noted in the logbook.
- Any presence of water, standing or flowing, will be noted in the logbook
- A standard format will be used to enter the collected data in the field logbook for each component.
- Each component will be photographed.

2.3 ENVIRONMENTAL SAMPLING

Environmental locations will be chosen based on results of the 1997 ABB-ES sampling event (ABB-ES, 1999), previous pipeline video inspections and visual inspections. The surface soil, surface water and sediment samples will be collected as specified in the RFI workplan (ABB-ES, 1991), in ABB-ES CLEAN Program Standard Operating Procedure number ND-SWSD-001-00, dated August 3, 1994 and outlined in Appendix C of this workplan. A detailed discussion of two DPT systems was presented in Appendix A of the original workplan (ABB-ES, 1995a). Some locations at the OWCS and Sewer Pipeline System may be sampled in conjunction with each other, as these two systems are often coincident.

2.3.1 Surface and Subsurface Soil Sampling

Surface soil samples will be only be collected in outfalls or drainage ditches that are not covered in asphalt or concrete. Surface soil samples will be collected at ground surface (0 to 1 foot bls) according to the sampling procedures outlined in Appendix C of this document.

Subsurface soil samples will be collected at the depth of the SWMUs 47 and 53 pipelines (between 3 and 10 feet bls). The depth of these samples will be determined by measuring the depth of the pipelines at junction boxes between the line segment being tested. Each sample point will be placed as close to the sewer line as is considered safe given the estimate of precision for its surveyed location. Sample points should be placed within 4 feet of the surveyed location of the pipeline.

The Terraprobe sampling system consists of a truck or van equipped with a combination hydraulic ram and hydraulic hammer. The ram and hammer use the weight of the vehicle to press and hammer a threaded, 1-inch diameter, hollow steel rod string fitted with an interchangeable, 24-inch long stainless-steel sampling tube. To drive to the sample depth, the sample tube is sealed with a cone tip. At the sample depth, the cone tip is retracted, and the rod string is driven 24 inches to fill the sample tube. Upon retrieval of the string, the soil sample can be extruded from the sample tube into precleaned glass sampling jars using a hydraulic piston. If necessary, the Terraprobe borings will be grouted upon completion. No investigation-derived waste other than decontamination rinsate is generated.

2.3.2 Sediment and Surface Water Sampling

Sediment and surface water samples will be collected if standing water is present at any of the SWMU 55 sampling locations. The samples will be taken at a low point in the drainageway, e.g., a low spot associated with the start of the concrete conveyance. If, however, the stormwater is collected from concrete or asphalt covered areas only, no surface soil or sediment sample will be collected. Sediment and surface water samples will be collected in accordance with procedures outlined in Appendix C of this document.

2.3.3 Groundwater Sampling

A groundwater sample will also be collected from each boring location to determine if the groundwater has been affected. Using the knowledge of groundwater flow direction gathered during previous investigations, the sampling points will be placed hydraulically downgradient from the defect in the pipeline to increase the probability that any release will be detected. Using the DPT tools, groundwater samples can be acquired in three ways. The preferred groundwater sampling technique uses either a customized probe with a self-contained filter pack to minimize the turbidity of the samples or, if that is unavailable, a probe with a slotted screen can be used. This latter probe is similar in design to an Aquapunch used on full-sized drill rigs. The third option is to use a conventional probe tip with a peristaltic pump at an extremely low flow rate to minimize the turbidity.

The groundwater will be sampled using low-flow purging techniques. Prior to groundwater sample collection, the temporary sampling point will be pumped using a peristaltic pump to minimize turbidity from the groundwater by pumping slowly enough to minimize the suspension of silt and clay in the sample. Turbidity, temperature, pH, and specific conductance will be measured during pumping to ensure good conductance between the temporary sampling point and the surrounding aquifer matrix. The temporary sampling point will be pumped until temperature, specific conductance and pH have stabilized and until the turbidity is below 5 nephelometric turbidity units (NTUs). A filtered sample will be collected at each groundwater sampling point that has a final turbidity reading greater than 5 NTU.

All groundwater samples will be collected using a peristaltic pump and disposable Teflon™ tubing. Volatile organic compounds (VOCs) will be collected first for samples submitted for laboratory analyses. The sampler will try to prevent agitation of the water in the temporary sampling point, and the groundwater samples will be carefully transferred to a VOC vial for shipment to the laboratory.

3.0 ANALYTICAL PROGRAM

The analytical program for the Group IV RFA SV at NAVSTA Mayport will address analytes selected from both the 40 CFR 264, Appendix IX groundwater monitoring list and the U.S. EPA Contract Laboratory Program (CLP) Target Compound List (TCL) and Target Analyte List (TAL). Tables 3-1 through 3-4, provided at the end of Section 3, provide summaries of analytical parameters in both lists, current target analytes, and target analytes that have been detected in previous investigations at NAVSTA Mayport. Gas chromatography and mass spectroscopy (GC/MS) methods will be used for analyses of environmental and QA/QC samples. Specifically, U.S. EPA Methods 5035/8260 will be used to analyze for VOCs (Table 3-1) and U.S. EPA Method 8270 will be used to analyze for SVOCs (Table 3-2). U.S. EPA Method 8081A will be used to analyze for chlorinated pesticides and Method 8082 will be used to analyze for polychlorinated biphenyls (PCBs) (Table 3-3). Organophosphorus pesticides and chlorinated herbicides are target analytes only at sites known to be used for pesticide storage, handling, and mixing. No such sites have been identified at Group IV; therefore, analyses will not be conducted for organophosphorus pesticides or chlorinated herbicides. Selected metals will be analyzed by inductively coupled plasma (ICP), graphite furnace atomic absorption (GFAA), or cold vapor atomic absorption (CVAA), as appropriate (e.g., U.S. EPA Methods 6010, 7420, or 7470) (Table 3-4). U.S. EPA Method 9010 will be used to analyze for cyanide. The data quality objective (DQO) for reporting the analytical results for VOCs, SVOCs, pesticides, PCBs and inorganics will be Naval Energy and Environmental Support Activity (NEESA) Level C.

3.1 DATA VALIDATION

The approach to providing reliable data that meet the DQOs will include QA/QC requirements for each type of analytical data generated during the field investigation. The QA/QC efforts for laboratory analyses will include collection and submittal of QC samples and the assessment and validation of data from the subcontract laboratories. Analytical data will be subjected to independent data validation in accordance with the following guidelines:

USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA 1994d).

USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (USEPA 1994e).

Navy Installation Restoration Laboratory Quality Assurance Guide (NFESC 1996).

3.2 SAMPLE ANALYSIS

Samples collected during the RFA field activities will be analyzed in accordance with the DQOs established in the Quality Assurance Program Plan (QAPP) found in Appendix A.

Data quality indicators include the precision, accuracy, representativeness, comparability, and completeness parameters. These parameters will be used within the data validation process to evaluate data quality. The achievable limits for these parameters vary with the DQO level of the data. The limits used for laboratory analytical data in this program will be those set by the CLP for Level D DQOs.

3.3 DATA EVALUATION

The purpose of this task is to assess the usability of validated data results based upon data comparisons to non-site-related conditions. Results that meet the DQO requirements and are considered usable will be compared to background sampling results. Results of the data evaluation will be documented in the RFA report. The following data evaluations and comparisons will be made:

Evaluation of detection limits.
Evaluation of counting errors.
Evaluation of equilibrium data.
Evaluation of qualified data.
Comparison of laboratory and field blanks to sample results.
Comparison of laboratory and field duplicate results.

Contaminants of potential concern (COPCs) will be identified through evaluation of the following criteria:

Background sampling results.
Frequency of detection.
Extent of contamination.

COPCs will be addressed throughout the data evaluation and risk assessment.

Site data will be compared to two times the background mean as well as the background maximum and other descriptive statistics. If necessary, statistical testing will be performed using the *t* test, Mann-Whitney test, or both. Results of the *t* test will be used when the data have a normal distribution or can be made to approximate the normal through transformation (taking the logarithm of each datum transforms a lognormal distribution to the normal). Results of the Mann-Whitney test will be used when at least one of the distributions being compared cannot be classified. Although not required to draw conclusions about the difference between background and site data, performing both tests simultaneously can provide a better understanding of the distributional patterns affecting test results.

3.4 DATA MANAGEMENT

The purpose of this task is to track and manage environmental and QC data collected during the field investigation from the time the data are obtained through data analysis and report evaluation. Coordination and management of environmental and QC sample analysis by the contracted laboratories is also part of this task. RFA activities generate data including sample locations, measurements of field parameters, and the results of laboratory analyses. Reports regarding the collection and analyses of sample data will also be generated. Management of data collected during RFA activities will ensure accessibility of data to support environmental data analysis, risk assessments, and the evaluation of remedial action alternatives.

Samples will be tracked from field collection activities to analytical laboratories following standard chain-of-custody procedures. Sample information recorded on the chain-of-custody forms will be transferred (electronically or manually) into the sample tracking portion of the database management system (DMS), thereby enabling the samples to be tracked through final disposition.

Analytical results, applicable QA/QC data, validation flags, chain-of-custody information, and any other applicable information will be incorporated into the DMS. All data will be verified after uploading to ensure completeness and accuracy.

Table 3-1
Gas Chromatograph and Mass Spectrometer Volatiles
Comparison of Target Analytes From Resource Conservation and Recovery Act Appendix IX Groundwater Monitoring List and U.S. Environmental Protection Agency Contract Laboratory Program Target Compound List

RFA SV Workplan, Group IV
U.S. Naval Station
Mayport, Florida

Volatile Organic Compounds	Appendix IX	CLP TCL	Currently A Target Analyte	Detected at NAVSTA Mayport
Chloromethane	_	x	x	_
Bromomethane	_	x	x	_
Vinyl chloride	x	x	x	_
Chloroethane	x	x	x	_
Methylene chloride	x	x	x	X
Acetone	x	x	x	X
Carbon disulfide	x	x	x	X
Trichlorofluoromethane	x	_	x	X
1,1-Dichloroethene	x	X	x	_
1,1-Dichloroethane	x	X	x	X
1,2-Dichloroethene (total)	x	x	x	_
Chloroform	x	x	x	X
1,2-Dichloroethane	x	x	x	_
2-Butanone	x	x	x	X
1,1,1-Trichloroethane	x	x	x	_
Carbon tetrachloride	x	x	x	_
Bromodichloromethane	x	x	x	X
1,2-Dichloropropane	x	x	x	_
cis-1,3-Dichloropropene	x	x	x	_
Trichloroethene	x	x	x	X
Benzene	x	x	x	X
Dibromochloromethane	x	x	x	X
1,1,2-Trichloroethane	x	x	x	_
trans-1,3-Dichloropropene	x	x	x	_
2-Chloroethylvinylether	_	_	x	_
Bromoform	X	x	x	_
2-Hexanone	X	x	x	_
Tetrachloroethene	X	x	x	_
1,1,2,2-Tetrachloroethane	X	x	x	X
Toluene	X	x	x	X
Chlorobenzene	x	x	x	X
Ethylbenzene	x	x	x	X
Styrene	x	x	x	_
Xylenes (total)	_	_	_	_

See notes at end of table.

Table 3-1 (Continued)
Gas Chromatograph and Mass Spectrometer Volatiles
Comparison of Target Analytes From Resource Conservation and Recovery Act Appendix IX Groundwater Monitoring List and U.S. Environmental Protection Agency Contract Laboratory Program Target Compound List

RFA SV Workplan, Group IV
U.S. Naval Station
Mayport, Florida

Volatile Organic Compounds	Appendix IX	CLP TCL	Currently A Target Analyte	Detected at NAVSTA Mayport
4-Methyl-2-pentanone	x	x	x	_
1,3-Dichlorobenzene	x	_	x	_
1,4-Dichlorobenzene	x	_	x	X
1,2-Dichlorobenzene	x	_	x	_
Acetonitrile	x	_	x	X
Acrolein	x	_	x	X
Acrylonitrile	x	_	x	_
Chloroprene	x	_	x	_
3-Chloropropene	x	_	x	_
1,2-Dibromo-3-chloropropane	x	_	x	X
1,2-Dibromoethane	x	_	x	_
Dibromomethane	x	_	x	_
1,4-Dioxane	x	_	x	_
Propionitrile	x	_	x	_
Ethyl Methacrylate	x	_	x	_
Iodomethane	x	_	x	_
Isobutyl alcohol	x	_	x	_
Methacrylonitrile	x	_	x	_
Methyl methacrylate	x	_	x	_
Vinyl acetate	x	_	x	_
Trans-1,4-dichloro-2-butene	x	_	x	_
Dichlorodifluoromethane	x	_	x	_
Pentachloroethane	x	_	x	_
1,1,1,2-Tetrachloroethane	x	_	x	_
1,2,3-Trichloropropane	x	_	x	_

Notes: Appendix IX = 40 Code of Federal Regulations Part 264, Appendix IX, Ground Water Monitoring List. Analytical Methodology for Appendix IX is *Test Methods for Evaluation of Solid Wastes*, U.S. EPA, SW 846, Third Edition, November, 1986 (and proposed update package, 1989.)
CLP TCL = U.S. Environmental Protection Agency Contract Laboratory Program, *Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration*, Exhibit C, target compound list and contract required quantitation limits, OLM01.0, July 1993.
x = target analytes for environmental and quality control samples collected at each Solid Waste Management Unit.
- = not a target analyte
NAVSTA = Naval Station.

SOURCE: ABB-ES, 1995a

Table 3-2
Gas Chromatograph and Mass Spectrometer Semivolatiles
Comparison of Target Analytes From Resource Conservation and Recovery Act Appendix IX Groundwater Monitoring List and U.S. Environmental Protection Agency Contract Laboratory Program Target Compound List

RFA SV Workplan, Group IV
U.S. Naval Station
Mayport, Florida

Semivolatile Organic Compounds	Appendix IX	CLP TCL	Currently A Target Analyte	Detected at NAVSTA Mayport
Acid Extractables				
Phenol	x	x	x	X
2-Chlorophenol	x	x	x	_
2-Methylphenol	x	x	x	X
4-Methylphenol	x	x	x	X
2-Nitrophenol	x	x	x	_
2,4-Dimethylphenol	x	x	x	X
2,4-Dichlorophenol	x	x	x	_
4-Chloro-3-methylphenol	x	x	x	_
2,4,6-Trichlorophenol	x	x	x	_
2,4,5-Trichlorophenol	x	x	x	_
2,4-Dinitrophenol	x	x	x	_
4-Nitrophenol	x	x	x	_
2-Methyl-4,6-dinitrophenol	x	x	x	_
Pentachlorophenol	x	x	x	x
2,3,4,6-Tetrachlorophenol	x	_	x	_
2,6-Dichlorophenol	x	_	x	_
Benzoic Acid	_	_	x	X

See notes at end of table.

Table 3-2 (Continued)
Gas Chromatograph and Mass Spectrometer Semivolatiles
Comparison of Target Analytes From Resource Conservation and Recovery Act Appendix IX Groundwater Monitoring List and U.S. Environmental Protection Agency Contract Laboratory Program Target Compound List

RFA SV Workplan, Group IV
U.S. Naval Station
Mayport, Florida

Semivolatile Organic Compounds	Appendix IX	CLP TCL	Currently A Target Analyte	Detected at NAVSTA Mayport
Base-Neutral Compounds				
1,3-Dichlorobenzene[1]	x	X	x	_
1,4-Dichlorobenzene[1]	x	x	x	_
1,2-Dichlorobenzene[1]	x	x	x	_
Hexachloroethane	x	x	x	_
1,2,4-Trichlorobenzene	x	x	x	_
Naphthalene[2]	x	x	x	X
Hexachlorobutadiene	x	x	x	_
Hexachlorocyclopentadiene	x	x	x	_
2-Chloronaphthalene	x	x	x	_
Acenaphthylene[2]	x	x	x	_
Acenaphthene[2]	x	x	x	X
Dibenzofuran	x	x	x	X
Fluorene[2]	x	x	x	X
4-Chlorophenyl-phenylether	x	x	x	_
4-Bromophenyl-phenylether	_	_	_	_
Hexachlorobenzene	x	x	x	_
Phenanthrene[2]	x	x	x	X
Anthracence[2]	x	x	x	X
Fluoranthene[2]	x	x	x	X
Pyrene[2]	x	x	x	X
Benzo(a)anthracene[2]	x	x	x	X
Chrysene[2]	x	x	x	X
Benzo(b)fluoranthene[2]	x	x	x	X
Benzo(k)fluoranthene[2]	x	x	x	_
Benzo(a)pyrene[2]	x	x	x	X
Indeno(1,2,3-cd)pyrene[2]	x	x	x	_
Dibenzo(a,h)anthracene[2]	x	x	x	_
Benzo(g,h,i)perylene[2]	x	x	x	X
bis(2-Chloroethyl)ether	x	_	x	_
n-Nitroso-di-n-propylamine	x	x	x	_

See notes at end of table.

Table 3-2 (Continued)
Gas Chromatograph and Mass Spectrometer Semivolatiles
Comparison of Target Analytes From Resource Conservation and Recovery Act Appendix IX Groundwater Monitoring List and U.S. Environmental Protection Agency Contract Laboratory Program Target Compound List

RFA SV Workplan, Group IV
U.S. Naval Station
Mayport, Florida

Semivolatile Organic Compounds	Appendix IX	CLP TCL	Currently A Target Analyte	Detected at NAVSTA Mayport
Nitrobenzene	x	x	x	_
Isophorone	x	x	x	_
bis(2-Chloroethoxy)methane	x	x	x	_
Dimethylphthalate	x	x	x	_
2,6-Dinitrotoluene	x	x	x	_
2,4-Dinitrotoluene	x	x	x	_
Diethylphthalate	x	x	x	X
n-Nitrosodiphenylamine	x	x	x	_
di-n-Butylphthalate	x	x	x	X
Butylbenzylphthalate	x	x	x	X
3,3'-Dichlorobenzidine	x	x	x	_
bis(2-Ethylhexyl)phthalate	x	x	x	X
di-n-Octylphthalate	x	x	x	X
n-Nitrosodimethylamine	x	_	x	X
2-Picoline	x	_	x	_
Diphenylamine	x	_	x	_
4-Nitroaniline	x	X	x	_
n-Nitrosomethylethylamine	x	_	x	_
4-Chloroaniline	x	X	x	_
Benzyl alcohol	x	_	x	_
n-Nitrosopiperidine	x	_	x	_
p-Phenylenediamine	x	_	x	_

See notes at end of table.

Table 3-2 (Continued)
Gas Chromatograph and Mass Spectrometer Semivolatiles
Comparison of Target Analytes From Resource Conservation and Recovery Act Appendix IX Groundwater Monitoring List and U.S. Environmental Protection Agency Contract Laboratory Program Target Compound List

RFA SV Workplan, Group IV
U.S. Naval Station
Mayport, Florida

Semivolatile Organic Compounds	Appendix IX	CLP TCL	Currently A Target Analyte	Detected at NAVSTA Mayport
3- and 4-Methylphenol	_	_	_	_
bis(2-Chloroisopropyl)ether	x	x	x	_
Pyridine	x	_	x	_
3,3'-Dimethylbenzidine	x	_	x	_
Isosafrole	x	_	x	_
Phenyl-tert-butylamine	x	_	x	_
1,2-Diphenylhydrazine		_	x	_
1,4-Naphthoquinone	x	_	x	_
1-Naphthylamine	x	_	x	_
Aramite	x	_	X	_
Hexachloropropene	x	_	x	_
Pronamide	x	_	x	_
2-Acetylaminofluorene	x	_	x	X
n-Nitrosodiethylamine	x	_	x	_
3-Methylcholanthrene	x	_	x	_
4-Nitroquinoline-1-oxide	x	_	x	_
7,12-Dimethylbenz(a)anthracene	x	_	x	_
n-Nitrosomorpholine	x	_	x	_
p-(Dimethylamino)azobenzene	x	_	x	_
Pentachlorobenzene	x	_	x	_
Phenacetin	x	_	x	_
Ethyl methanesulfonate	x	_	x	_
Aniline	x	_	x	_
Methyl methanesulfonate	x	_	x	_
Hexachlorophene	x	_	x	_
Pentachloronitrobenzene	x	_	x	_
2-Nitroaniline	x	x	x	_
2-Methylnaphthalene[2]	x	x	x	X
2-Naphthylamine	x	_	x	_
Methapyrilene	x	_	x	_
4-Aminobiphenyl	x	_	x	_
Benzidine	_	_	x	_
n-Nitroso-di-n-butylamine	X	_	x	_
n-Nitrosopyrrolidine	X	_	x	_
Safrole	X	_	x	_
o-Toluidine	X	_	x	_
1,2,4,5-Tetrachlorobenzene	X	_	x	_

See notes at end of table.

Table 3-2 (Continued)
Gas Chromatograph and Mass Spectrometer Semivolatiles
Comparison of Target Analytes From Resource Conservation and Recovery Act Appendix IX Groundwater Monitoring List and U.S. Environmental Protection Agency Contract Laboratory Program Target Compound List

RFA SV Workplan, Group IV
U.S. Naval Station
Mayport, Florida

Semivolatile Organic Compounds	Appendix IX	CLP TCL	Currently A Target Analyte	Detected at NAVSTA Mayport
Acetophenone	x	–	x	–
3-Nitroaniline	x	X	x	–
1,3,5-Trinitrobenzene	x	–	x	–
5-Nitro-o-toluidine	x	–	x	–
1,3-Dinitrobenzene	x	–	x	–
Carbazole		x	–	–

[1] Analyte is both a volatile and semivolatile target analyte.
[2] Analyte is a polynuclear aromatic hydrocarbon.

Notes: Appendix IX = 40 Code of Federal Regulations Part 264, Appendix IX, Ground Water Monitoring List. Analytical Methodology for Appendix IX is *Test Methods for Evaluation of Solid Wastes*, U.S. EPA, SW 846, Third Edition, November, 1986 (and proposed update package, 1989.)
CLP TCL = U.S. Environmental Protection Agency Contract Laboratory Program, *Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration*, Exhibit C, target compound list and contract required quantitation limits, OLM01.0, July 1993.
x = Target analytes for environmental and quality control samples collected at each Solid Waste Management Unit.
- = not a target analyte
NAVSTA = Naval Station.

SOURCE: ABB-ES 1995a

Table 3-3
Gas Chromatograph Pesticides, Herbicides, and Polychlorinated Biphenyls Comparison of Target Analytes From Resource Conservation and Recovery Act Appendix IX Groundwater Monitoring List and U.S. Environmental Protection Agency Contract Laboratory Program Target Compound List

RFA SV Workplan, Group IV
U.S. Naval Station
Mayport, Florida

Pesticides, Herbicides, and Polychlorinated Biphenyls	Appendix IX	CLP TCL	Currently A Target Analyte	Detected at NAVSTA Mayport
Organochlorine Pesticides				
alpha-Benzene hexachloride (BHC)	x	x	x	X
beta-BHC	x	x	x	X
delta-BHC	x	x	x	X
gamma-BHC (Lindane)	x	x	x	_
Heptachlor	x	x	x	X
Aldrin	X	x	x	_
Heptachlor epoxide	X	x	x	X
Endosulfan I	X	x	x	_
Dieldrin	X	x	x	_
4,4'-Dichlorodiphenyldichloroethylene (4,4'-DDE)	X	x	x	X
Endrin	X	x	x	_
Endosulfan II	X	x	x	_
4,4'-Dichlorodiphenyldichloroethane (4-4'-DDD)	X	x	x	X
Endosulfan sulfate	X	x	x	_
4,4'-Dichlorodiphenyltrichloroethane (4,4'-DDT)	X	x	x	X
Methoxychlor	X	x	X	_
Endrin keytone	_	x	X	_
Endrin aldehyde	x	x	X	_
alpha-Chlordane	x	x	X	x
gamma-Chlordane	x	x	X	x
Toxaphene	x	x	X	_
Organophosphorus Pesticides	_	_	_	_
Aspon-SS	x	_	★	_
Triethylphosphorothioate	x	_	★	_
Thionazin	x	_	★	_
Parathion methyl	x	_	★	_
Phorate	x	_	★	_
Disulfoton	x	_	★	_
Sulfotepp	x	_	★	_
Famphur	x	_	★	_
Parathion ethyl	x	_	★	_
Dimethoate	_	_	_	_
See notes at end of table.				

Table 3-3 (Continued)
Gas Chromatograph Pesticides, Herbicides, and Polychlorinated Biphenyls
Comparison of Target Analytes From Resource Conservation and Recovery Act Appendix IX Groundwater Monitoring List and U.S. Environmental Protection Agency Contract Laboratory Program Target Compound List

RFA SV Workplan, Group IV
U.S. Naval Station
Mayport, Florida

Pesticides, Herbicides, and Polychlorinated Biphenyls	Appendix IX	CLP TCL	Currently A Target Analyte	Detected at NAVSTA Mayport
Chlorinated Herbicides	–	–		–
2,4-Dichlorophenylacetic acid	–	–	★	–
3,5-Dichlorobenzoic acid	–	–	★	–
Dinoseb	X	–	★	–
(2,4,5-Trichlorophenoxy)-acetic acid (2,4,5-T)	X	–	★	–
α-(2,4,5-Trichlorophenoxy) propionic acid (2,4,5-TP) (Silvex)	X	–	★	–
2,4-Dichlorophenoxyacid (2,4-D)	–	–	★	–
Polychlorinated Biphenyls (PCBs)	–	–	–	–
Aroclor-1016	x	x	x	–
Aroclor-1221	x	x	x	–
Aroclor-1232	x	x	X	–
Aroclor-1242	x	x	X	–
Aroclor-1248	x	x	X	X
Aroclor-1254	x	x	X	–
Aroclor-1260	x	x	X	x

Notes: Appendix IX = 40 Code of Federal Regulations Part 264, Appendix IX, Ground Water Monitoring List. Analytical Methodology for Appendix IX is *Test Methods for Evaluation of Solid Wastes*, U.S. EPA, SW 846, Third Edition, November, 1986 (and proposed update package, 1989.)
CLP TCL = U.S. Environmental Protection Agency Contract Laboratory Program, *Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration*, Exhibit C, target compound list and contract required quantitation limits, 0LM01.0, July 1993.
x = target analytes for environmental and quality control samples collected at each Solid Waste Management Unit.
★ = target analytes for environmental and quality control samples collected at pesticide handling and storage sites.
- = not a target analyte
NAVSTA = Naval Station
SOURCE: ABB-ES 1995a

Table 3-4
Inorganics and Cyanide
Comparison of Target Analytes From Resource Conservation and Recovery Act Appendix IX Groundwater Monitoring List and U.S. Environmental Protection Agency Contract Laboratory Program Target Analyte List

RFA SV Workplan, Group IV
U.S. Naval Station
Mayport, Florida

Inorganics and Cyanide	Appendix IX	CLP TAL	Currently A Target Analyte	Detected at NAVSTA Mayport
Aluminum	_	x	_	_
Antimony	X	x	x	x
Arsenic	X	x	x	x
Barium	X	x	x	x
Beryllium	X	x	x	x
Cadmium	X	x	x	x
Calcium	_	x	x	x
Chromium	X	x	x	x
Cobalt	X	x	x	x
Copper	X	x	x	x
Iron	_	x	x	x
Lead	X	x	x	x
Magnesium	_	x	x	x
Manganese	_	x	x	x
Mercury	X	x	x	x
Nickel	X	x	x	x
Potassium	_	x	x	x
Selenium	X	x	x	x
Silver	X	X	x	x
Sodium	_	X	x	x
Thallium	x	X	x	x
Tin	x	_	x	x
Vanadium	x	x	x	x
Zinc	x	x	x	x
Cyanide	x	x	x	x

Notes: Appendix IX = 40 Code of Federal Regulations Part 264, Appendix IX, Ground Water Monitoring List. Analytical Methodology for Appendix IX is *Test Methods for Evaluation of Solid Wastes*, U.S. EPA, SW 846, Third Edition, November, 1986 (and proposed update package, 1989.)
CLP TAL = U.S. Environmental Protection Agency Contract Laboratory Program, *Statement of Work for Inorganic Analysis, Multi-Media, Multi-Concentration*, target analyte list and contract required quantitation limits, ILMO1.0, March 1990.
x = target analytes for environmental and quality control samples collected at each Solid Waste Management Unit.
- = not a target analyte
NAVSTA = Naval Station.

SOURCE: ABB-ES 1995a

4.0 PRELIMINARY RISK SCREENING

This preliminary risk screening section is reproduced from the original RFA Sampling Visit Workplan for Group IV (ABB-ES, 1995a). If data analysis indicates risk screening is required, this section will be revised to reflect the most current approved methodologies and site specific data available. If a human health or ecological risk assessment is needed the methodologies discussed in the AOC C workplan (TtNUS, 1999) for Naval Station Mayport will be followed.

A human health and ecological risk screening will be conducted for the Group IV RFA SV SWMUs 47, 53, and 55 at NAVSTA Mayport to support decisions to conduct an RFI or to recommend no further action. The preliminary human health risk screening process will be conducted according to the following State, Federal and USEPA Region IV guidance:

- *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A)* (USEPA 1989a).
- *Supplemental Guidance to RAGS: USEPA Region IV Bulletins, Human Health Risk Assessment* (USEPA 1995a).
- *Exposure Factors Handbook* (USEPA 1997a).
- *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance "Standard Default Exposure Factors", Interim Final* (USEPA 1991b).
- *Dermal Exposure Assessment: Principles and Applications, Interim Report* (USEPA 1992b).
- *Guidance for Data Usability in Risk Assessment* (Part A) (USEPA 1992a).
- *Risk Assessment Guidance for Superfund: Volume I, Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments)*. (USEPA 1998a).
- *Florida Administrative Code, Chapter 62-777.*

The preliminary ecological risk screening process will be conducted according to the following State, Federal and USEPA Region IV guidance:

- *Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities, and Inclusion of Stakeholders (USEPA, 1998X)*
- *Department of the Navy Ecological Risk Assessment Policy Memorandum (DON, 1999)*
- *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (USEPA, 1997b).

- *Guidelines for Ecological Risk Assessment* (USEPA, 1998b).
- *Tri-Service proceedural Guidelines for Ecological Risk Assessments* (Wentsel, et al., 1996).

The screening will consist of comparing analytical results with a number of benchmark screening values. For human health, these benchmark values will be taken from the risk-based screening concentrations, the Superfund proposed soil screening levels (SSL), and the cleanup goals for military sites in Florida presented in the Group I and II RFA SV report for NAVSTA Mayport (ABB-ES, 1995). For the ecological screening, EPA Region IV screening levels will be used (EPA, 1998 x).

Surface and Subsurface Soil Analytical Results. The target analytes detected in the environmental samples will be compared to background screening values computed from station-wide surface and subsurface soil sample analytical results (ABB-ES, 1994; 1995b), benchmark values from U.S. EPA Region III risk based concentrations (RBCs) (U.S. EPA, 1994a), the U.S. EPA Superfund SSLs (U.S. EPA, 1994b), and the soil cleanup goals for Florida (FDEP, 1995). Surface and subsurface soil concentrations will be compared to an aggregate residential exposure (child and adult) for U.S. EPA Region III RBCs and U.S. EPA SSLs. Values for Florida cleanup goals consist of aggregate residential exposure (child and adult) for surface soil, whereas subsurface soil concentrations were compared to an excavation worker exposure.

Each of the benchmark criteria are human health based and represent the lower of either a noncarcinogenic hazard index (HI), where values of less than 1 represent a concentration at which noncarcinogenic effects are not likely, or a lifetime excess cancer risk of $1x10^{-6}$, which represents a chance of 1 in 1,000,000 for an adverse carcinogenic effect for a continuous lifetime exposure. The concentrations listed for the U.S. EPA Region III RBCs correspond to an HI of 0.1, whereas the U.S. EPA Superfund SSLs and the State of Florida cleanup goals are based on an HI of 1. The Federal National Oil and Hazardous Substance Pollution Contingency Plan final rule (40 CFR, Part 300) states that, for carcinogens, a lifetime excess cancer risk in the range of $1x10^{-4}$ (a chance of 1 in 10,000 for an adverse carcinogenic effect for a continuous lifetime exposure) to $1x10^{-6}$ represents concentrations that are protective of human health. For the ecological screening, Region IV (EPA, 1998x) surface soil screening levels will be used.

Groundwater Analytical Results. The target analytes detected in the environmental samples will be compared with background screening values computed from station-wide background groundwater sample analytical results (ABB-ES, 1994; 1995b), benchmark values consisting of U.S. EPA Region III RBCs (U.S. EPA, 1994a), and Florida groundwater guidance concentrations (FDEP, 1999). The Florida groundwater guidance concentrations consist of promulgated and unpromulgated values. Promulgated and unpromulgated values that are exceeded will be identified in the text. Each of the benchmark criteria are human health based and represent the lower of either a noncarcinogenic HI of 1 or a lifetime excess cancer risk of $1x10^{-6}$. As previously stated, Benchmark values for a noncarcinogenic HI of 1 or less represent a concentration where noncarcinogenic effects are not likely. A benchmark value for a lifetime excess cancer risk of $1x10^{-6}$ represents a chance of 1 in 1,000,000 for an adverse carcinogenic effect for a continuous lifetime exposure. For the ecological screening, groundwater concentrations will be compared to Region IV (EPA, 1998x) surface water screening levels when groundwater could potentially discharge to surface water.

Surface Water Samples. The target analytes detected in the environmental samples will be compared to station wide background surface water sample analytical results (ABB-ES, 1994; 1995b), benchmark values from ambient water quality from the Office of Science and Technology, Health and Ecological Criteria Division, Washington D.C., May 1, 1991 (U.S. EPA, 1991a), and Florida Surface Water Quality Standards. For the ecological risk assessment, surface water chemical concentrations will be compared to Region IV (EPA, 1998x) surface water screening levels

Sediment Samples. The target analytes detected in the environmental samples will be compared to station-wide background sediment sample results (ABB-ES, 1994; 1995b) and EPA Region IV (EPA, 1998x) sediment screening levels.

5.0 SCHEDULE

The schedule for completion of RFA SV activities at SWMUs 47, 53, and 55 has not yet been determined. The schedule will assume ready access to all sites and no delays due to the securing of required permits. The schedule may also be modified by the nature and extent of regulatory review cycles and new data collected during the RFA.

The project team for the execution of this workplan will be determined after a final schedule has been generated.

6.0 INVESTIGATION-DERIVED WASTE MANAGEMENT

IDW generated during the RFA field activities will be managed in accordance with the practices and procedures perviously taken by the CLEAN I contractor as described in the *Draft Resource Conservation and Recovery Act Facility Investigation (RFI) Work Plan, Addendum 1, Investigation-Derived Waste Management Plan* (ABB-ES, 1992). Tetra Tech NUS, Inc. emphasizes that management of all IDW will be handled in an environmentally responsible manner consistent with RCRA requirements (USEPA, 1991a). The objectives of IDW management are:

- management of IDW in a manner that prevents contamination of uncontaminated areas (by IDW) and that is protective of human health and the environment;
- minimization of IDW, thereby reducing costs and the potential for human or ecological exposure to contaminated materials; and
- compliance with federal and state requirements that are appropriate or relevent and applicable requirements (ARARs).

A copy of the Draft 1992 Mayport IDW Plan has been previously included in the final workplan for the AOC C investigation (TtNUS, 1999).

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APPENDIX A

HEALTH AND SAFETY PLAN

Health and Safety Plan
for
Facility Assessment Sampling Visit

Solid Waste Management Units 47, 53, and 55

NAVAL STATION
Mayport, Florida

Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888
Contract Task Order 0091

December 1999

HEALTH AND SAFETY PLAN
FOR
FACILITY ASSESSMENT SAMPLING VISIT

SOLID WASTE MANAGEMENT UNITS
47, 53, AND 55

NAVAL STATION
MAYPORT, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Department of the Navy, Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29419-9010

Submitted by:
TetraTech NUS, Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh, Pennsylvania 15220-2745

CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0091

DECEMBER 1999

SUBMITTED BY:

TERRY HANSEN, P.G.
TASK ORDER MANAGER
TETRA TECH NUS, INC.
TALLAHASSEE, FLORIDA

APPROVED BY:

Matthew M. Soltis

MATTHEW M. SOLTIS, CIH, CSP
CLEAN HEALTH & SAFETY MANAGER
TETRA TECH NUS, INC
PITTSBURGH, PENNSYLVANIA

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1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been developed to provide practices and procedures for Tetra Tech NUS, Inc. (TtNUS) and subcontractor personnel engaged in investigatory activities at the Naval Station in Mayport, Florida (NAVSTA Mayport). This HASP must be used in conjunction with the TtNUS Health and Safety Guidance Manual. Both of these documents must be present at the site during the performance of all site activities. The Guidance Manual provides detailed information pertaining to the HASP as well as applicable TtNUS Standard Operating Procedures (SOPs). This HASP and the contents of the Guidance Manual were developed to comply with the requirements stipulated in 29 CFR 1910.120 (OSHA's Hazardous Waste Operations and Emergency Response Standard), OSHA's Construction Industry Standards, 29 CFR 1926; and NAVSTA Mayport procedures and protocol, as they may apply.

This HASP has been developed using the latest available information regarding known or suspected chemical contaminants and potential physical hazards associated with the proposed work at the site. The HASP will be modified if new information becomes available. All changes to the HASP will be made with the approval of the TtNUS Project Health and Safety Officer (PHSO) and the TtNUS Health and Safety Manager (HSM). Requests for modifications to the HASP will be directed to the PHSO, who will determine if the changes are necessary. The PHSO will notify the Task Order Manager (TOM), who will notify all affected personnel of changes.

1.1 KEY PROJECT PERSONNEL AND ORGANIZATION

This section defines responsibility for site safety and health for TtNUS and subcontractor employees engaged in onsite activities. Personnel assigned to these positions will exercise the primary responsibility for all onsite health and safety. These persons will be the primary point of contact for any questions regarding the safety and health procedures and the selected control measures that are to be implemented for onsite activities.

- The TtNUS TOM is responsible for the overall direction of health and safety for this project.

- The PHSO is responsible for developing this HASP in accordance with applicable OSHA regulations. Specific responsibilities include:

  i. Providing information regarding site contaminants and physical hazards associated with the site.

ii. Establishing air monitoring and decontamination procedures.
iii. Assigning personal protective equipment based on task and potential hazards.
iv. Determining emergency response procedures and emergency contacts.
v. Stipulating training requirements and reviewing appropriate training and medical surveillance certificates.
vi. Providing standard work practices to minimize potential injuries and exposures associated with hazardous waste work.
vii. Modify this HASP, as it becomes necessary.

- The TtNUS Field Operations Leader (FOL) is responsible for implementation of the HASP with the assistance of an appointed SSO. The FOL manages field activities, executes the work plan, and enforces safety procedures as applicable to the work plan.

- The SSO supports site activities by advising the FOL on all aspects of health and safety on site. These duties may include:

i. Coordinates all health and safety activities with the FOL.
ii. Selects, applies, inspects, and maintains personal protective equipment.
iii. Establishes work zones and control points in areas of operation.
iv. Implements air monitoring program for onsite activities.
v. Verifies training and medical clearance of onsite personnel status in relation to site activities.
vi. Implements Hazard Communication, Respiratory Protection Programs, and other associated health and safety programs as they may apply to site activities..
vii. Coordinates emergency services.
viii. Provides site-specific training for all onsite personnel.
ix. Investigates all accidents and injuries (see Attachment I - Illness/Injury Procedure and Report Form)
x. Provides input to the PHSO regarding the need to modify, this HASP, or applicable health and safety associated documents as per site-specific requirements.

- Compliance with the requirements stipulated in this HASP is monitored by the SSO and coordinated through the TtNUS CLEAN HSM.

Note: In some cases one person may be designated responsibilities for more than one position. For example, at the NAVSTA Mayport, the FOL may also be responsible for SSO duties. This action will be performed only as credentials or experience permits.

1.2 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

Site Name: Naval Station Mayport, Florida

Client Contact: Randy Bishop
Phone Number: (904) 270-6730

Scheduled Activities: This activity will be divided into a multi-task operation, including the tasks of site inspections, soil gas sampling, tracer gas leak testing, soil boring (drilling), and multi-media sampling. Further detail on these and other site tasks can be found in Section 4 of this HASP.

Dates of scheduled activities: Site activities are expected to begin in the Spring, 2000 and continue until project completion.

Project Team:

TtNUS Management Personnel:	Discipline/Tasks Assigned:
Terry Hansen, P.G.	Task Order Manager (TOM)
TBD	Field Operations Leader (FOL)
TBD	Site Safety Officer (SSO)
Matthew M. Soltis, CIH, CSP	CLEAN Health and Safety Manager
Delwyn E. Kubeldis, CIH, CSP	Project Health and Safety Officer (PHSO)

Other Potential TtNUS Project Personnel:

TBD	Field Geologist

Non-TtNUS Personnel Affiliation/Discipline/Tasks Assigned

TBD	Drilling subcontractor

Prepared by: Delwyn E. Kubeldis, CIH, CSP

2.0 EMERGENCY ACTION PLAN

2.1 INTRODUCTION

This section has been developed as part of a planning effort to direct and guide field personnel in the event of an emergency. All site activities will be coordinated with the client contact, Randy Bishop. In the event of an emergency which cannot be mitigated using onsite resources, personnel will evacuate to a safe place of refuge and the appropriate emergency response agencies will be notified. It has been determined that the majority of potential emergency situations would be better supported by outside emergency responders. Based on this determination, TtNUS and subcontractor personnel will not provide emergency response support beyond the capabilities of onsite response. Workers who are ill or who have suffered a non-serious injury may be transported by site personnel to nearby medical facilities, provided that such transport does not aggravate or further endanger the welfare of the injured/ill person. The emergency response agencies listed in this plan are capable of providing the most effective response, and as such, will be designated as the primary responders. These agencies are located within a reasonable distance from the area of site operations, which ensures adequate emergency response time. NAVSTA Mayport contact Randy Bishop will be notified anytime outside response agencies are contacted. This Emergency Action Plan conforms to the requirements of 29 CFR 1910.38(a), as allowed in 29 CFR 1910.120(l)(1)(ii).

TtNUS will, through necessary services, provide the following emergency action measures:

- Incipient stage fire fighting support and prevention
- Incipient spill control and containment measures and prevention
- Removal of personnel from emergency situations
- Initial medical support for injuries or illnesses requiring basic first-aid
- Site control and security measures as necessary

2.2 PRE-EMERGENCY PLANNING

Through the initial hazard/risk assessment effort, emergencies resulting from chemical, physical, or fire hazards are the types of emergencies which could be encountered during site activities.

To minimize and eliminate the potential for these emergency situations, pre-emergency planning activities will include the following (which are the responsibility of the SSO and/or the FOL):

- Coordinating with local Emergency Response personnel to ensure that TtNUS emergency action activities are compatible with existing emergency response procedures. Base Fire Protection and Emergency Services will be notified of scheduled events and activities. This is most imperative in situations where their services may be required.

- Establishing and maintaining information at the project staging area (support zone) for easy access in the event of an emergency. This information will include the following:

  - Chemical Inventory (of chemicals used onsite), with Material Safety Data Sheets.
  - Onsite personnel medical records (Medical Data Sheets).
  - A log book identifying personnel onsite each day.
  - Hospital route maps with directions (these should also be placed in each site vehicle).
  - Emergency Notification - phone numbers.

The TtNUS FOL will be responsible for the following tasks:

- Identifying a chain of command for emergency action.

- Educating site workers to the hazards and control measures associated with planned activities at the site, and providing early recognition and prevention, where possible.

- Periodically performing practice drills to ensure site workers are familiar with incidental response measures.

- Providing the necessary equipment to safely accomplish identified tasks.

2.3 EMERGENCY RECOGNITION AND PREVENTION

2.3.1 Recognition

Emergency situations that may be encountered during site activities will generally be recognized by visual observation. Visual observation is primarily relevant for physical hazards that may be associated with the proposed scope of work. Visual observation will also play a role in detecting some chemical hazards. To adequately recognize chemical exposures, site personnel must have a clear knowledge of signs and symptoms of exposure associated with site contaminants. This information is provided in Table 6-1. Tasks to be performed at the site, potential hazards associated with those tasks and the recommended control methods are discussed in detail in Sections 5.0 and 6.0. Additionally, early recognition of hazards will be supported by daily site surveys to eliminate any situation predisposed to an emergency. The FOL and/or the SSO will be responsible for performing surveys of work areas prior to initiating site operations and periodically while operations are being conducted. Survey findings will be documented by the FOL and/or the SSO in the Site Health and Safety logbook, however, all site personnel will be responsible for reporting hazardous situations. Where potential hazards exist, TtNUS will initiate control measures to prevent adverse effects to human health and the environment.

The above actions will provide early recognition for potential emergency situations, and allow TtNUS to instigate necessary control measures. However, if the FOL and the SSO determine that control measures are not sufficient to eliminate the hazard, TtNUS will withdraw from the site and notify the appropriate response agencies listed in Table 2-1.

2.3.2 Prevention

TtNUS and subcontractor personnel will minimize the potential for emergencies by following the Health and Safety Guidance Manual and ensuring compliance with the HASP and applicable OSHA regulations. Daily site surveys of work areas, prior to the commencement of that day's activities, by the FOL and/or the SSO will also assist in prevention of illness/injuries when hazards are recognized early and control measures initiated.

2.4 EVACUATION ROUTES, PROCEDURES, AND PLACES OF REFUGE

An evacuation will be initiated whenever recommended hazard controls are insufficient to protect the health, safety or welfare of site workers. Specific examples of conditions that may initiate an evacuation include, but are not limited to the following: severe weather conditions; fire or explosion; monitoring instrumentation readings which indicate levels of contamination are greater than instituted action levels; and evidence of personnel overexposure to potential site contaminants.

In the event of an emergency requiring evacuation, all personnel will immediately stop activities and report to the designated safe place of refuge unless doing so would pose additional risks. When evacuation to the primary place of refuge is not possible, personnel will proceed to a designated alternate location and remain until further notification from the TtNUS FOL. Safe places of refuge will be identified prior to the commencement of site activities by the SSO and will be conveyed to personnel as part of the pre-activities training session. This information will be reiterated during daily safety meetings. Whenever possible, the safe place of refuge will also serve as the telephone communications point for that area. During an evacuation, personnel will remain at the refuge location until directed otherwise by the TtNUS FOL or the on-site Incident Commander of the Emergency Response Team. The FOL or the SSO will perform a head count at this location to account for and to confirm the location of all site personnel. Emergency response personnel will be immediately notified of any unaccounted personnel. The SSO will document the names of all personnel onsite (on a daily basis) in the site Health and Safety Logbook. This information will be utilized to perform the head count in the event of an emergency.

Evacuation procedures will be discussed during the pre-activities training session, prior to the initiation of project tasks. Evacuation routes from the site and safe places of refuge are dependent upon the location at which work is being performed and the circumstances under which an evacuation is required. Additionally, site location and meteorological conditions (i.e., wind speed and direction) may dictate evacuation routes. As a result, assembly points will be selected and communicated to the workers relative to the site location where work is being performed. Evacuation should always take place in an upwind direction from the site.

2.5 DECONTAMINATION PROCEDURES / EMERGENCY MEDICAL TREATMENT

During any site evacuation, decontamination procedures will be performed only if doing so does not further jeopardize the welfare of site workers. Decontamination will not be performed if the incident warrants immediate evacuation. However, it is unlikely that an evacuation would occur which would require workers to evacuate the site without first performing the necessary decontamination procedures.

TtNUS personnel will perform removal of personnel from emergency situations and may provide initial medical support for injury/illnesses requiring only first-aid level support. Medical attention above that level will require assistance and support from the designated emergency response agencies. Attachment I provides the procedure to follow when reporting an injury/illness, and the form to be used for this purpose. **If the emergency involves personnel exposures to chemicals, follow the steps provided in Figure 2-1.**

TABLE 2-1

**EMERGENCY REFERENCE
NAVAL STATION
MAYPORT, FLORIDA**

AGENCY	TELEPHONE
EMERGENCY	911
Fire Department	911 or (904) 270-5333
Base Security	(904) 270-5583 or 5584
Base Medical Clinic (For life threatening emergencies only)	(904) 270-5444
Memorial Health Care Center (For other emergencies)	(904) 858-7500
Base Safety Department	(904) 270-5218
Site Point of Contact, Mr. Randy Bishop	(904) 270-6730
Public Works Trouble Desk (for problems with utilities)	(904) 542-2122
Chemtrec National Response Center	(800) 424-9300 (800) 424-8802
Task Order Manager Terry Hansen	(850) 656-5458
Health and Safety Manager Matthew M. Soltis, CIH, CSP	(412) 921-8912
Project Health and Safety Officer Delwyn E. Kubeldis, CIH, CSP	(412) 921-8529

NOTE: When calling base telephone numbers from within the Base (i.e., from an on-base telephone), dial a zero (0) and the last four digits of the telephone number. For example, to contact the Base Medical Clinic dial 05444.

2.6 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES

TtNUS personnel will be working in close proximity to each other at NAVSTA Mayport. As a result, hand signals, voice commands, and line of site communication will be sufficient to alert site personnel of an emergency. When project tasks are performed simultaneously on different sites, vehicle horns will be used to communicate emergency situations.

If an emergency warranting evacuation occurs, the following procedures are to be initiated:

- Initiate the evacuation via hand signals, voice commands, line of site communication, or vehicle horns. The following signals shall be utilized when communication via vehicle horn is necessary:

HELP	three short blasts	(. . .)
EVACUATION	three long blasts	(- - -)

- Report to the designated refuge point.
- Once all non-essential personnel are evacuated, appropriate response procedures will be enacted to control the situation.
- Describe to the FOL (FOL will serve as the Incident Coordinator) pertinent incident details.

FIGURE 2-1
EMERGENCY RESPONSE PROTOCOL

The purpose of this protocol is to provide guidance for the medical management of exposure situations.

In the event of a personnel exposure to a hazardous substance or agent:

- Rescue, when necessary, employing proper equipment and methods.
- Give attention to emergency health problems -- breathing, cardiac function, bleeding, shock.
- Transfer the victim to the medical facility designated in this HASP by suitable and appropriate conveyance (i.e. ambulance for serious events)
- Obtain as much exposure history as possible (a Potential Exposure report is attached).
- If the exposed person is a Tetra Tech NUS employee, call the medical facility and advise them that the patient(s) is/are being sent and that they can anticipate a call from the Continuum Healthcare physician. Continuum Healthcare will contact the medical facility and request specific testing which may be appropriate. The care of the victim will be monitored by Continuum Healthcare physicians. Site officers and personnel should not attempt to get this information, as this activity leads to confusion and misunderstanding.
- Call Continuum Healthcare at 1-800-229-3674, being prepared to provide:
  - Any known information about the nature of the exposure.
  - As much of the exposure history as was feasible to determine in the time allowed.
  - Name and phone number of the medical facility to which the victim(s) has/have been taken.
  - Name(s) of the exposed Tetra Tech NUS, Inc. employee(s).
  - Name and phone number of an informed site officer who will be responsible for further investigations.
  - Fax appropriate MSDS to Continuum Healthcare at (770) 457-1429.
- Contact Corporate Health and Safety Department (Matt Soltis) at 1-800-245-2730.

As environmental data is gathered and the exposure scenario becomes more clearly defined, this information should be forwarded to the Continuum Healthcare Medical Director or Assistant Medical Director.

Continuum Healthcare will compile the results of all data and provide a summary report of the incident. A copy of this report will be placed in each victim's medical file in addition to being distributed to appropriately designated company officials.

Each involved worker will receive a letter describing the incident but deleting any personal or individual comments. This generalized summary will be accompanied by a personalized letter describing the individual's findings/results. A copy of the personal letter will be filed in the continuing medical file maintained by Continuum Healthcare.

FIGURE 2-1 (continued)
POTENTIAL EXPOSURE REPORT

Name: ______________________ Date of Exposure: ______________

Social Security No.: ______________ Age: __________ Sex: __________

Client Contact: ______________________ Phone No.: ______________

Company Name: ______________________

I. **Exposing Agent**
Name of Product or Chemicals (if known): ______________________
____

Characteristics (if the name is not known)
Solid Liquid Gas Fume Mist Vapor

II. **Dose Determinants**
What was individual doing? ______________________
How long did individual work in area before signs/symptoms developed? ______________
Was protective gear being used? If yes, what was the PPE? ______________
Was there skin contact? ______________________
Was the exposing agent inhaled? ______________________
Were other persons exposed? If yes, did they experience symptoms? ______________

III. **Signs and Symptoms** (check off appropriate symptoms)

Immediately With Exposure:

Burning of eyes, nose, or throat
Tearing
Headache
Cough
Shortness of Breath
Chest Tightness / Pressure
Nausea / Vomiting
Dizziness
Weakness

Delayed Symptoms:

Weakness
Nausea / Vomiting
Shortness of Breath
Cough
Loss of Appetite
Abdominal Pain
Headache
Numbness / Tingling

IV. **Present Status of Symptoms** (check off appropriate symptoms)
Burning of eyes, nose, or throat
Tearing
Headache
Cough
Shortness of Breath
Chest Tightness / Pressure
Cyanosis
Nausea / Vomiting
Dizziness
Weakness
Loss of Appetite
Abdominal Pain
Numbness / Tingling

Have symptoms: (please check off appropriate response and give duration of symptoms)
Improved: ________ Worsened: ________ Remained Unchanged: ________

V. **Treatment of Symptoms** (check off appropriate response)
None: ________ Self-Medicated: ________ Physician Treated: ________

In the event that site personnel cannot mitigate the hazardous situation, the FOL and SSO will enact emergency notification procedures to secure additional assistance in the following manner:

- Dial 911 (outside services) and call other pertinent emergency contacts listed in Table 2-1 and report the incident. Give the emergency operator the location of the emergency, the type of emergency, the number of injured, and a brief description of the incident. Stay on the phone and follow the instructions given by the operator. The operator will then notify and dispatch the proper emergency response agencies.

2.7 PPE AND EMERGENCY EQUIPMENT

A first-aid kit, eye wash units (or bottles of disposable eyewash solution) and fire extinguishers (strategically placed) will be maintained onsite and shall be immediately available for use in the event of an emergency. This equipment will be located in the field office as well as in each site vehicle. At least one first aid kit supplied with equipment to protect against bloodborne pathogens will also be available on site. Personnel identified within the field crew with bloodborne pathogen and first-aid training will be the only personnel permitted to offer first-aid assistance.

2.8 EMERGENCY CONTACTS

Prior to initiating field activities, all personnel will be thoroughly briefed on the emergency procedures to be followed in the event of an accident. Table 2-1 provides a list of emergency contacts and their associated telephone numbers. This table must be posted where it is readily available to all site personnel. Facility maps should also be posted showing potential evacuation routes and designated meeting areas.

2.9 EMERGENCY ROUTE TO HOSPITAL

The Base Medical Clinic should be used for life-threatening emergencies only. Memorial Health Care Center will be used for medical care beyond basic first aid treatment. Directions to the Center are:

> Exit base, take Mayport Road (A1A) to Atlantic Blvd. Take a right onto Atlantic Blvd. across the Intercoastal Waterway. At the first intersection, take a left onto San Pablo Blvd. The Medical Center is at the intersection of San Pablo Blvd. and Beach Blvd. (14444 Beach Blvd.)

A map indicating the travel route from the site to the Medical Center will be inserted as Figure 2-2.

As soon as possible Navy contact Randy Bishop must be informed of any incident or accident that requires medical attention.

Any pertinent information regarding allergies to medications or other special conditions will be provided to medical services personnel. This information is listed on Medical Data Sheets filed onsite. If an exposure to hazardous materials has occurred, provide hazard information from Table 6-1 to medical service personnel.

Figure 2-2 Route to Hospital

3.0 SITE BACKGROUND

3.1 SITE HISTORY AND INVESTIGATION AREAS

NAVSTA Mayport is in Duval County, Florida, approximately 16 miles northeast of Jacksonville and at the mouth of the St. Johns River. The base was established in 1942 and is primarily involved in the intermediate-level maintenance of equipment, ships, aircraft, and other support units stationed at the facility.,

The USEPA has identified 56 Solid Waste Management Units (SWMUs) and 2 areas of concern (AOCs) at NAVSTA Mayport. Due to the number of SWMUs at NAVSTA Mayport, the diversity of their past and/or present operations, and the magnitude of permit requirements, the USEPA recommended that a phased approach be used to implement various environmental investigations and other corrective action activities. A Corrective Action Management Plan (CAMP) was prepared that describes the phased approach, proposed schedule, and strategy to implement the RCRA Corrective Action Program at NAVSTA Mayport. From the CAMP the SWMUs and AOCs were separated into four groups. Group IV SWMUs are not directly associated within a given geographic area, but consist of utility networks and systems that span multiple geographic areas across NAVSTA Mayport. The SWMUs to be investigated in this group are related by the fact that they transport wastewater or petroleum-related liquids. Group IV includes SWMUs 47, 53, and 55, which are the subject of the Work Plan addressed by this HASP.

3.2 PROJECT SITE DESCRIPTIONS

3.2.1 SWMU 47 – Oily Waste Collection System (OWCS)

The oily waste collection system is a system of gravity pipelines, lift stations, and force mains that convey oily bilge water collected from ships at the piers and oily water from operations at the Firefighting Training Center (FFTC) to the oily waste treatment plant (OWTP). A majority of the system was constructed during 1978 to 1980 from ductile iron pipe that is not cathodically protected. Piping at Alpha Pier was replaced in 1991, and Foxtrot Pier was constructed in 1994. The collection system can be broken into two subsystems: the gravity feed system used to convey the oily wastewater (primarily bilge water) from the oily waste risers at the piers to the lift stations, and the lift stations with force main pipelines that convey oily wastes to the OWTP (SWMU 9).

Investigation of SWMU 47 is being conducted because of the highly permeable soil, the shallow water table, the proximity of the OWCS to surface water, the age of the system, the lack of testing, and the history of failures. The assessment at SWMU 47, therefore, is intended to thoroughly inspect all the gravity sewer lines and force main sewer lines in the OWCS. This inspection will consist of a tracer gas leak test of soil in the vicinity of the pipeline; visual inspection of pier risers for signs of damage, spills, and leaks; and visual inspection at each of the liftstations. At each location where the video or tracer gas results suggest a breach in the line, soil-screening data will be collected by direct push technology (DPT) sampling or equivalent technology.

3.2.2 SWMU 53 – Sewer Pipeline

Like SWMU 47, the sewer lines are composed of gravity feed pipelines, lift stations, and force main sewer lines. The sewer pipeline transports industrial wastewater to the WWTF in addition to the domestic sewage. Prior reports state that the industrial operations that contribute wastewater flow to the WWTF include Shore Intermediate Maintenance Activity (SIMA), Aircraft Intermediate Maintenance Depot (AIMD), helicopter maintenance hangars, commercial shipyards, and the ships berthed in the Mayport Turning Basin. Reports also state that wastes that could possibly be discharged through floor drains and sinks by these industrial activities include paint wastes, cleaning compounds, degreasers, foundry cleaning liquids, water from oil-water separators, and effluent from a ship's combined holding tanks.

Investigation at SWMU 53 is being conducted because of the high permeability of the soil at NAVSTA Mayport, the shallow water table, the proximity to surface water, and the potential for release of material to the soil, groundwater, and surface water. Because some of the sewer lines originate in an industrial setting, the sewer pipelines will be investigated.

3.2.3 SWMU 55 – Storm Sewer and Drainage System

The storm sewer system conveys run-off to the St. Johns River, Sherman Creek, Lake Wonderwood, the Mayport Turning Basin, and the Atlantic Ocean. Many of the storm sewer pipes that discharge to the surrounding surface water are fed by unlined drainage ditches found over the entire facility. Prior reports state that the flight line retention ponds (SWMU 49), the boiler blowdown at Building 250, and the Hobby Shop Drain (SWMU 20), discharge into the stormwater drainage system. Both the flight line retention ponds and the hobby shop drain have been investigated in previous sampling efforts. The unlined drainage ditch system that runs throughout the base is a possible recipient of any uncontrolled spills of hazardous material and leaks from underground systems such as the OWCS (SWMU 47) or the oil-water separator (SWMU 54).

Further investigation of the storm sewer and drainage system is being conducted due to the highly permeable soil at NAVSTA Mayport, the shallow groundwater table, and the fact that the stormwater discharges directly to surface water. In addition, the drainage system was indicated as possibly containing hazardous constituents discharged to it in the industrial areas of the facility.

4.0 SCOPE OF WORK

This section describes the project tasks that will be performed at NAVSTA Mayport. Additionally, each task has been evaluated and the associated hazards and recommended control measures are listed in Table 5-1 of this HASP. The planned activities involved in this effort are presented in detail in the Work Plan developed for the project. If new tasks are to be performed at the site, Table 5-1 and this section will be modified accordingly.

Field investigations to be performed by TtNUS are designed to characterize soil and groundwater conditions at NAVSTA Mayport. Specific tasks to be conducted include, but are not necessarily limited to, the following:

- Soil borings (using Direct Push Technology and hand augers)
- Multi-media sampling, including:
  - Soil (surface and subsurface)
  - Groundwater and surface water
  - Soil gas
  - Sediment
- Installation of soil gas monitoring points
- Miscellaneous non-intrusive activities, including site surveys, tracer gas investigations, and visual inspections
- Decontamination of sampling and heavy equipment
- Mobilization and demobilization

The above listing represents a summarization of the tasks as they apply to the scope and application of this HASP. For more detailed description of the associated tasks refer to the Work Plan (WP). If additional tasks are determined to be necessary, this HASP will be amended and a hazard evaluation of the additional tasks performed.

5.0 TASKS/HAZARDS/ASSOCIATED CONTROL MEASURES SUMMARIZATION

Table 5-1 of this section serves as the primary portion of the site-specific HASP which identifies the tasks that are to be performed as part of the scope of work. This table will be modified and incorporated into this document as new or additional tasks are performed at the site. The anticipated hazards, recommended control measures, air monitoring recommendations, required Personal Protective Equipment (PPE), and decontamination measures for each site task are discussed in detail. This table and the associated control measures shall be changed, if the scope of work, contaminants of concern, or other conditions change.

Through using the table, site personnel can determine which hazards are associated with each task and at each site, and what associated control measures are necessary to minimize potential exposure or injuries related to those hazards. The table also assists field team members in determining which PPE and decontamination procedures to use based on proper air monitoring techniques and site-specific conditions.

As discussed earlier, a Health and Safety Guidance Manual accompanies this table and HASP. The manual is designed to further explain supporting programs and elements for other site -specific aspects as required by 29 CFR 1910.120. The Guidance Manual should be referenced for additional information regarding air monitoring instrumentation, decontamination activities, emergency response, hazard assessments, hazard communication and hearing conservation programs, medical surveillance, PPE, respiratory protection, site control measures, standard work practices, and training requirements. Many of Tetra Tech NUS' SOPs are also provided in this Guidance Manual.

Safe Work Permits issued for all exclusion zone activities (See Section 10.10) will use elements defined in Table 5-1 as it's primary reference. The FOL and/or the SSO completing the Safe Work Permit will add additional site-specific information. In situations where the Safe Work Permit is more conservative than the direction provided in Table 5-1 due to the incorporation of site-specific elements, the Safe Work Permit will be followed.

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TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM FOR NAVAL STATION, MAYPORT, FLORIDA

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment	Decontamination Procedures
Soil borings using Direct-Push Technology (DPT, such as the Geoprobe®) and hand augers. This task also includes installation of soil gas monitoring points.	*Chemical Hazards* 1) Primary types of contaminants include VOCs, specifically solvents (represented as trichloroethylene and perchloroethylene) and gasoline; SVOCs, including Total Petroleum Hydrocarbons (TPHs) such as diesel fuel, waste oils, and general Polynuclear Aromatic Hydrocarbons (PAH's), and PCBs. Note that these contaminants may be bound to particulates (dusts, soils, etc.) and contact with dusts should be avoided whenever possible. None of the site contaminants, however, are anticipated to be present in significant concentrations to present an inhalation hazard. See Table 6-1 for more information on the chemicals of concern. 2) Transfer of contamination into clean areas or onto persons *Physical hazards* 3) Heavy equipment hazards (pinch/compression points, rotating equipment, hydraulic lines, etc.) 4) Noise in excess of 85 dBA 5) Energized systems (contact with underground or overhead utilities) 6) Lifting (strain/muscle pulls) 7) Slip, trips, and falls 8) Vehicular and foot traffic 9) Ambient temperature extremes (heat stress) *Natural hazards* 10) Insect/animal bites and stings (including fire ants and Eastern diamondback rattlesnakes) 11) Inclement weather	1) Use real-time monitoring instrumentation, action levels, and identified PPE to control exposures to potentially contaminated media (air, water, soils, etc.). Generation of dusts should be minimized. If airborne dusts are observed, area wetting methods may be used. If area wetting methods are not feasible, termination of activities may be used to minimize exposure to excessive airborne dusts. 2) Decontaminate all equipment and supplies between boreholes and prior to leaving the site. 3) All equipment to be used will be - Inspected in accordance with Federal safety and transportation guidelines, OSHA (1926.600,.601,.602), and manufacturers design and documented as such using Equipment Inspection Sheet (see Attachment III of this HASP). - Operated by knowledgeable operators and ground crew. - Only manufacturer approved equipment may be used in conjunction with equipment repair procedures In addition to the equipment considerations, the following standard operating procedures will be employed: - All personnel not directly supporting the direct push operation will remain at least 25 feet from the point of operation. - All loose clothing/protective equipment will be secured to avoid possible entanglement. - Hand signals will be established prior to the commencement of direct push activities. - A remote sampling device must be used to sample drill cuttings near rotating tools. - Work areas will be kept clear of clutter. - All personnel will be instructed in the location and operations of the emergency shut off device(s). This device will be tested initially (and then periodically) to insure its operational status. - Areas will be inspected prior to the movement of direct push rigs and support vehicles to eliminate any physical hazards. This will be the responsibility of the FOL and/or SSO. 4) Hearing protection will be used during all subsurface activities. 5) All utility clearances shall be obtained, in writing, prior to subsurface activities (contact Randy Bishop). Prior to any subsurface investigations, the locations of all underground utilities will be identified and marked. 6) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. 7) Preview work locations for unstable/uneven terrain. 8) Traffic and equipment considerations are to include the following: - Establish safe zones of approach (I.e. Boom + 3 feet). - Secure all loose articles to avoid possible entanglement. - All equipment shall be equipped with movement warning systems. - All activities are to be conducted consistent with the Base requirements. 9) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat stress concerns is provided in Section 4 of the TtNUS Health and Safety Guidance Manual. 10) Avoid potential nesting areas of biting/stinging insects and snakes. Use commercially available insect repellents. Wear appropriate clothing, including snake chaps where warranted. Tape ankle and wrists areas to prevent fire ants, ticks, chiggers, etc. from attaching themselves to you skin. Wear light colored clothing so that biting insects can be easily visible and be removed. Follow directions as specified in Section 6.3 and Attachment II concerning natural hazards. 11) Suspend or terminate operations until directed otherwise by SSO	**It is anticipated that potential contaminant concentrations at outdoor sample locations will not present an inhalation hazard.** A direct reading Photoionization Detector (PID) or Flameionization Detector (FID) will be used to screen samples and to detect the presence of any potential volatile organics. Source monitoring of the borehole will be conducted at regular intervals to be determined by the SSO. Positive sustained results at a source or downwind location(s) which may impact operations crew will require the following actions: - Monitor the breathing zone of at-risk and downwind employees. Any sustained readings (greater than 1 minute in duration) above 10 ppm in the breathing zone of the at-risk employees requires site activities to be suspended and site personnel to report to an unaffected area. - Work may only resume if airborne readings in worker breathing zone return to below 10 ppm levels. If elevated readings in worker breathing zone persist, the PHSO and HSM will be contacted to determine necessary actions and levels of protection. Site contaminants may adhere to or be part of airborne dusts or particulates generated during site activities. Generation of dusts should be minimized to avoid inhalation of contaminated dusts or particulates. Evaluation of dust concentrations will be performed by observing work conditions for visible dust clouds. Potential exposure to contaminated dust will be controlled using water suppression, by avoiding dust plumes, or evacuating the operation area until dust subsides. Where the utility clearance cannot be determined, subsurface activities shall proceed with extreme caution using a magnetometer for periodic down-hole surveys every 2 feet to a depth of at least 10 feet.	All subsurface operations are to be initiated in Level D protection. Level D protection constitutes the following minimum protection - Standard field attire (Sleeved shirt; long pants) - Safety shoes (Steel toe/shank) - Safety glasses - Nitrile gloves or leather gloves with surgical style inner gloves - Hardhat - Reflective vest for traffic areas - *Tyvek coveralls and disposable boot covers if surface contamination is present or if the potential exists for soiling work attire. Coveralls may also be worn to protect exposed skin from insects, fire ants, etc. Joints (ankles and wrists) should be taped.* - *Snake chaps shall be worn in areas of known or suspected snake infestation.* - *Hearing protection during drilling or for other high noise areas as directed by the SSO.* *(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)* **Note:** The Safe Work Permit(s) for this task (see Attachment IV) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.	**Personnel Decontamination** - Will consist of a soap/water wash and rinse for reusable protective equipment (e.g., gloves). This function will take place at an area adjacent to the drilling operations bordering the support zone. This decontamination procedure for Level D protection will consist of - Equipment drop - Soap/water wash and rinse of reusable outer gloves, as applicable - Outer coveralls, boot covers, and/or outer glove removal - Removal, segregation, and disposal of non-reusable PPE in bags/containers provided - Wash hands and face, leave contamination reduction zone. In addition, workers should inspect themselves and one another for the presence of fire ants, ticks, and other insects when exiting wooded areas, grassy fields, etc. This action will be employed to stop the transfer of these insects into vehicles, homes, and offices.

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM FOR
NAVAL STATION, MAYPORT, FLORIDA

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment	Decontamination Procedures
Multi-media sampling, including soil, groundwater, surface water, sediment, and soil gas sampling.	*Chemical Hazards* 1) Primary types of contaminants include VOCs, specifically solvents (represented as trichloroethylene and perchloroethylene) and gasoline; SVOCs, including Total Petroleum Hydrocarbons (TPHs) such as diesel fuel, waste oils, and general Polynuclear Aromatic Hydrocarbons (PAH's), and PCBs. Note that these contaminants may be bound to particulates (dusts, soils, etc.) and contact with dusts should be avoided whenever possible. None of the site contaminants, however, are anticipated to be present in significant concentrations to present an inhalation hazard. See Table 6-1 for more information on the chemicals of concern. 2) Transfer of contamination into clean areas *Physical hazards* 3) Noise in excess of 85 dBA 4) Lifting (strain/muscle pulls) 5) Pinches and compressions 6) Slip, trips, and falls 7) Ambient temperature extremes (heat stress) 8) Vehicular and foot traffic 9) Working over or near water (drowning) *Natural hazards* 10) Insect/animal bites and stings (including fire ants and Eastern diamondback rattlesnakes) 11) Inclement weather	1) Use real-time monitoring instrumentation, action levels, and identified PPE to control exposures to potentially contaminated media (e.g. air, water, soils). Generation of dusts should be minimized. If airborne dusts are observed, area wetting methods may be used. If area wetting methods are not feasible, termination of activities may be used to minimize exposure to observed airborne dusts. 2) Decontaminate all equipment and supplies between sampling locations and prior to leaving the site. 3) When sampling at the Geoprobe use hearing protection. The use of hearing protection outside of 25 feet from the Geoprobe should be incorporated under the following condition: If you have to raise your voice to talk to someone who is within 2 feet of your location, hearing protection must be worn. 4) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. 5) Keep any machine guarding in place. Avoid moving parts. Use tools or equipment where necessary to avoid contacting pinch points. - A remote sampling device must be used to sample drill cuttings near rotating tools. The equipment operator shall shutdown machinery if the sampler is near moving machinery parts. 6) Preview work locations for unstable/uneven terrain. 7) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding cold/heat stress concerns is provided in Section 4 of the TtNUS Health and Safety Guidance Manual. 8) Traffic and equipment considerations are to include the following: - Establish safe zones of approach (i.e. Boom + 3 feet). - Secure all loose articles to avoid possible entanglement. - All equipment shall be equipped with movement warning systems. - All activities are to be conducted consistent with the Base requirements. 9) All personnel working on or near water will wear USCG-approved flotation devices. At least one life saving skiff or other vessel shall be immediately available for rescue purposes. 10) Avoid potential nesting areas of biting/stinging insects and snakes. Use commercially available insect repellents. Wear appropriate clothing, including snake chaps where warranted. Tape ankle and wrists areas to prevent fire ants, ticks, chiggers, etc. from attaching themselves to you skin. Wear light colored clothing so that biting insects can be easily visible and be removed. Follow directions as specified in Section 6.3 and Attachment II concerning natural hazards. 11) Suspend or terminate operations until directed otherwise by SSO	**It is anticipated that potential contaminant concentrations at outdoor sample locations will not present an inhalation hazard.** A direct reading Photoionization Detector (PID) or Flameionization Detector (FID) will be used to screen samples and to detect the presence of any potential volatile organics. Source monitoring of the borehole will be conducted at regular intervals to be determined by the SSO. Positive sustained results at a source or downwind location(s) which may impact operations crew will require the following actions: - Monitor the breathing zone of at-risk and downwind employees. Any sustained readings (greater than 1 minute in duration) above 10 ppm in the breathing zone of the at-risk employees requires site activities to be suspended and site personnel to report to an unaffected area. - Work may only resume if airborne readings in worker breathing zone return to below 10 ppm levels. If elevated readings in worker breathing zone persist, the PHSO and HSM will be contacted to determine necessary actions and levels of protection. Site contaminants may adhere to or be part of airborne dusts or particulates generated during site activities. Generation of dusts should be minimized to avoid inhalation of contaminated dusts or particulates. Evaluation of dust concentrations will be performed by observing work conditions for visible dust clouds. Potential exposure to contaminated dust will be controlled using water suppression, by avoiding dust plumes, or evacuating the operation area until dust subsides.	Level D protection will be utilized for the initiation of all sampling activities. Level D - (Minimum Requirements) - Standard field attire (Sleeved shirt; long pants) - Safety shoes (steel toe/shank) - Safety glasses - Surgical style gloves (double-layered if necessary) - Reflective vest for high traffic areas - *Hardhat (when overhead hazards exists, or identified as a operation requirement)* - *Tyvek coveralls and disposable boot covers if surface contamination is present or if the potential exists for soiling work attire. Coveralls may also be worn to protect exposed skin from insects, fire ants, etc. Joints (ankles and wrists) should be taped.* - *Snake chaps shall be worn in areas of known or suspected snake infestation.* *(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)* **Note:** The Safe Work Permit(s) for this task (see Attachment IV) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.	**Personnel Decontamination** will consist of a removal and disposal of non-reusable PPE (gloves, coveralls, etc., as applicable). The decon function will take place at an area adjacent to the site activities. This procedure will consist of: - Equipment drop - Outer coveralls, boot covers, and/or outer glove removal (as applicable) - Removal, segregation, and disposal of non-reusable PPE in bags/containers provided - Soap/water wash and rinse of reusable PPE (e.g., hardhat) if potentially contaminated - Wash hands and face, leave contamination reduction zone. In addition, workers should inspect themselves and one another for the presence of fire ants, ticks, and other insects when exiting wooded areas, grassy fields, etc. This action will be employed to stop the transfer of these insects into vehicles, homes, and offices.

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM FOR
NAVAL STATION, MAYPORT, FLORIDA

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment	Decontamination Procedures
Mobilization/ Demobilization	*Physical Hazards* 1) Lifting (strain/muscle pulls) 2) Pinches and compressions 3) Slip, trips, and falls 4) Heavy equipment hazards (rotating equipment, hydraulic lines, etc.) 5) Vehicular and foot traffic 6) Ambient temperature extremes (heat stress) *Natural hazards* 7) Insect/animal bites and stings (including fire ants and Eastern diamondback rattlesnakes) 8) Inclement weather	1) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. 2) Keep any machine guarding in place. Avoid moving parts. Use tools or equipment where necessary to avoid contacting pinch points. 3) Preview work locations for unstable/uneven terrain. 4) All equipment will be - Inspected in accordance with OSHA, and manufacturer's design. - Operated by knowledgeable operators, and knowledgeable ground crew. 5) Traffic and equipment considerations are to include the following: - Establish safe zones of approach (i.e. Boom + 3 feet). - Secure all loose articles to avoid possible entanglement. - All equipment shall be equipped with movement warning systems. - All activities are to be conducted consistent with the Base requirements. 6) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding cold/heat stress concerns is provided in Section 4 of the TtNUS Health and Safety Guidance Manual. 7) Avoid potential nesting areas of biting/stinging insects and snakes. Use commercially available insect repellents. Wear appropriate clothing, including snake chaps where warranted. Tape ankle and wrists areas to prevent fire ants, ticks, chiggers, etc. from attaching themselves to you skin. Wear light colored clothing so that biting insects can be easily visible and be removed. Follow directions as specified in Section 6.3 and Attachment II concerning natural hazards. 8) Suspend or terminate operations until directed otherwise by SSO.	Not required	Level D - (Minimum Requirements) - Standard field attire (Sleeved shirt; long pants) - Safety shoes (Steel toe/shank) - *Safety glasses* - *Hardhat (when overhead hazards exists, or identified as a operation requirement)* - *Reflective vest for high traffic areas* - *Coveralls may be worn to protect exposed skin from insects, fire ants, etc. Joints (ankles and wrists) should be taped.* - *Snake chaps shall be worn in areas of known or suspected snake infestation.* *(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)*	Not required
Decontamination of Sampling and Heavy Equipment	*Chemical Hazards* 1) Primary types of contaminants include VOCs, specifically solvents (represented as trichloroethylene and perchloroethylene) and gasoline; SVOCs, including Total Petroleum Hydrocarbons (TPHs) such as diesel fuel, waste oils, and general Polynuclear Aromatic Hydrocarbons (PAH's), and PCBs. Note that these contaminants may be bound to particulates (dusts, soils, etc.) and contact with dusts should be avoided whenever possible. None of the site contaminants, however, are anticipated to be present in significant concentrations to present an inhalation hazard. See Table 6-1 for more information on the chemicals of concern. 2) Decontamination fluids - Liquinox (detergent), acetone or isopropanol *Physical Hazards* 3) Lifting (strain/muscle pulls) 4) Noise in excess of 85 dBA 5) Flying projectiles 6) Vehicular and foot traffic 7) Ambient temperature extremes (heat stress) 8) Slips, trips, and falls	1) and 2) Employ protective equipment to minimize contact with site contaminants and hazardous decontamination fluids. Obtain manufacturer's MSDS for any decontamination solvents used onsite. Use appropriate PPE as identified on MSDS. All chemicals used must be listed on the Chemical Inventory for the site, and site activities must be consistent with the Hazard Communication section of the Health and Safety Guidance Manual (Section 5). 3) Use multiple persons where necessary for lifting and handling sampling equipment for decontamination purposes. 4) Wear hearing protection when operating pressure washer. 5) Use eye and face protective equipment when operating pressure washer. All other personnel must be restricted from the area. 6) Traffic and equipment considerations are to include the following: - Establish safe zones of approach (i.e. Boom + 3 feet). - Secure all loose articles to avoid possible entanglement. - All equipment shall be equipped with movement warning systems. - All activities are to be conducted consistent with the Base requirements. 7) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding cold/heat stress concerns is provided in Section 4 of the TtNUS Health and Safety Guidance Manual. 8) Preview work locations for unstable/uneven terrain.	Use visual observation, and real-time monitoring instrumentation to ensure all equipment has been properly cleaned of contamination and dried. After decon is completed, screen equipment with a PID/FID. If any elevated readings (i.e., above background) are observed, perform decon again and rescreen. Repeat until no elevated PID/FID readings are noted.	For Heavy Equipment This applies to high pressure soap/water, steam cleaning wash and rinse procedures. Level D Minimum requirements - - Standard field attire (Long sleeve shirt; long pants) - Safety shoes (Steel toe/shank) - Chemical resistant boot covers - Nitrile outer gloves - *PVC Rainsuits or PE or PVC coated Tyvek* - *Safety glasses underneath a splash shield* - *Hearing protection (plugs or muffs)* *Items in italics are at the discretion of the SSO.* For sampling equipment (trowels, MacroCore Samplers, bailers, etc.), the following PPE is required Level D Minimum requirements - - Standard field attire (Long sleeve shirt; long pants) - Safety shoes (Steel toe/shank) - Nitrile outer gloves - Safety glasses	**Personnel Decontamination** will consist of a soap/water wash and rinse for reusable outer protective equipment (boots, gloves, PVC splash suits, as applicable). The decon function will take place at an area adjacent to the site activities. This procedure will consist of: - Equipment drop - Soap/water wash and rinse of outer boots and gloves, as applicable - Soap/water wash and rinse of the outer splash suit, as applicable - Disposable PPE will be removed and bagged. **Equipment Decontamination** - All heavy equipment decontamination will take place at a centralized decontamination pad utilizing steam or pressure washers. The Geoprobe will have the wheels and tires cleaned along with any loose debris removed, prior to transporting to the central decontamination area. All site vehicles will have restricted access to exclusion zones, and have their wheels/tires sprayed off as not to track mud onto the roadways servicing this installation. Roadways shall be cleared of any debris resulting from the onsite activity. **Sampling Equipment Decontamination** Sampling equipment will be decontaminated as per the requirements in the Sampling and Analysis Plan and/or Work Plan. MSDS for any decon solutions (Alconox, isopropanol, etc.) will be obtained and used to determine proper handling / disposal methods and protective measures (PPE, first-aid, etc.). All equipment used in the exclusion zone will require a complete decontamination between locations and prior to removal from the site. The FOL or the SSO will be responsible for evaluating equipment arriving onsite and leaving the site. No equipment will be authorized access or exit without this evaluation.

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM FOR NAVAL STATION, MAYPORT, FLORIDA

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment	Decontamination Procedures
Miscellaneous non-intrusive activities, including site surveys, tracer gas investigations, and visual inspections.	***Chemical hazards:*** **Exposure to potential site contaminants during these activities is unlikely given the nature of the work and the limited contact with potentially contaminated media.** ***Physical hazards:*** 1) Slip, trips, and falls ***Natural Hazards:*** 2) Insect/animal bites and stings (including fire ants and Eastern diamondback rattlesnakes) 3) Inclement weather	1) Preview work locations and site lines for uneven and unstable terrain. Clear necessary vegetation, establish temporary means for traversing hazardous terrain(i.e., rope ladders, etc.) 2) Avoid potential nesting areas of biting/stinging insects and snakes. Use commercially available insect repellents. Wear appropriate clothing, including snake chaps where warranted. Tape ankle and wrists areas to prevent fire ants, ticks, chiggers, etc. from attaching themselves to you skin. Wear light colored clothing so that biting insects can be easily visible and be removed. Follow directions as specified in Section 6.3 and Attachment II concerning natural hazards. 3) Suspend or terminate operations until directed otherwise by SSO.	No air monitoring is needed given the unlikelihood that volatile contaminants are present during surveying activities and the non-intrusive nature of the task. The potential for exposure to site contaminants during this activity is considered minimal. Minimize the generation of airborne dusts since most site contaminants are in the form of a particulate or may be bound to particulates.	These miscellaneous activities will be performed in Level D protection (unless otherwise indicated) consisting of the following: - Standard field dress including sleeved shirt and long pants - Steel-toe work boots or shoes - Safety glasses and hard hats (if working near machinery) - *Coveralls may also be worn to protect exposed skin from insects, fire ants, etc. Joints (ankles and wrists) should be taped.* - *Snake chaps shall be worn in areas of known or suspected snake infestation.* *(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)*	Personnel Decontamination - A structured decontamination is not required as the likelihood of encountering contaminated media is considered remote. Workers should inspect themselves and one another for the presence of fire ants, ticks, and other insects when exiting wooded areas, grassy fields, etc. This action will be employed to stop the transfer of these insects into vehicles, homes, and offices.

6.0 HAZARD ASSESSMENT

The following section provides information regarding the chemical, physical, and natural hazards anticipated to be present during the activities to be conducted. Table 6-1 provides information related to chemical constituents that have been identified by analysis or are suspected to be present at the site based on historical data. Specifically, toxicological information, exposure limits, symptoms of exposure, physical properties, and air monitoring and sampling data are discussed in the table.

6.1 CHEMICAL HAZARDS

The potential health hazards associated with NAVSTA Mayport include inhalation, ingestion, and dermal contact of various contaminants that may be present in shallow and deep soils, sediments, surface water, and groundwater. As the focus of this field investigation is to conduct additional sampling of various media at the associated sites, concentrations of the chemical hazards present are not fully determined. Based on the operations at the piers and the hazardous materials used at the facilities/buildings impacting these SWMUs, the types of contaminants anticipated include diesel fuel, waste oil products, gasoline, and solvents. The following have been identified as the primary classes of these contaminants, including the specific compound(s) of interest:

- Volatile Organic Compounds (VOCs), specifically solvents (represented as trichloroethylene and perchloroethylene) and gasoline
- Semi-Volatile Organic Compounds (SVOCs), including Total Petroleum Hydrocarbons (TPHs) such as diesel fuel, waste oils, and general Polynuclear Aromatic Hydrocarbons (PAH's)
- Polychlorinated Biphenyls (PCBs)

Table 6-1 provides information on the compounds and individual substances likely to be present at the sites to be investigated. Included is information on the toxicological, chemical, and physical properties of these substances. It is anticipated that the greatest potential for exposure to site contaminants is during intrusive activities (drilling, soil sampling, etc.). Exposure to these compounds is most likely to occur through ingestion and inhalation of contaminated soil or water, or hand-to-mouth contact during soil disturbance activities. For this reason, PPE and basic hygiene practices (washing face and hands before leaving site) will be extremely important. Inhalation exposure will be avoided by using appropriate PPE and engineering controls where necessary. Significant exposure via inhalation is not anticipated during the planned scope of work.

TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAVAL STATION
MAYPORT, FLORIDA

Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Diesel Fuel No.2-D	Mixture	Components of this substance will be detected readily; however, no documentation exists as to the relative response ratio of either PID or FID.	Air sampling use charcoal tube as a collection media; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol in accordance with NIOSH Method #1550.	OSHA; NIOSH; ACGIH: 5 mg/m^3 as mineral oil mist. In addition NIOSH and ACGIH establish 10 mg/m^3 as a STEL.	Kerosene odor **Recommended air-purifying cartridges:** Organic vapor **Recommended gloves:** Nitrile	**Boiling Pt:** <300-550°F; 149-288°C **Melting Pt:** Not available **Solubility:** Negligible **Flash Pt:** 95-145°F; 35-62°C **Autoignition:** 475°F, 246°C **LEL/LFL:** 0.6% **UEL/UFL:** 8.0% **Vapor Density:** >5 **Vapor Pressure:** <0.1 mmHg @ 70°F; 21°C **Specific Gravity:** 0.80 **Incompatibilities:** strong oxidizers, halogens, and hypochlorites **Appearance and odor:** Colorless to amber with a kerosene odor	Prolonged or repeated exposures to this product may cause skin and eye irritation. Because of the defatting capabilities ,this exposure may lead to a dermatitis condition. High vapor concentrations are irritating to the eyes and respiratory tract. Exposure to high airborne concentrations may result in narcotic effects, including dizziness, headaches, and anesthetic to unconsciousness. High concentrations in a confined space may adequately displace oxygen thereby resulting in suffocation.
Waste Oils All information is based on mineral oil	Mixture N.E. 8012-95-1 for mineral oil	Varies between fractions however waste oils tend to be less volatile. The FID tends to handle the longer chained aliphatic hydrocarbons more efficiently than its PID counterpart and would be selected as the instrument of choice.	Sampling and analytical protocol shall be in accordance with NIOSH Method #5026 (the recommended method for mineral oil mist).	ACGIH; NIOSH: 5 mg/m^3 (oil mists); 10 mg/m^3 STEL. OSHA; 5 mg/m^3 (Oil mists)	Non-volatile substance, therefore no respiratory protection is required. In an aerosol form, dust and mist respirator would be considered acceptable for up to 500 mg/m^3. **Recommended gloves: Any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances, and will be acceptable). Natural rubber gloves should be avoided.** **Recommended gloves:** Nitrile	**Boiling Pt:** 680°F; 360°C **Melting Pt:** Not available **Solubility:** Insoluble **Flash Pt:** 275-500°F; 135-260°C depends on the distillation fraction **LEL/LFL:** Not available **UEL/UFL:** Not available **Vapor Density:** Not available **Vapor Pressure:** <0.5 mmHg **Specific Gravity:** 0.90 **Incompatibilities:** None reported **Appearance and odor:** Colorless, oily, with an odor of burned lubricating oil.	Minor irritation to the eyes, skin, and respiratory system.
Trichloroethylene	79-01-6	PID: I.P. 9.45 eV, High response with PID and 10.2 eV lamp. FID: 70% Response with FID.	Air sample using charcoal tube; carbon disulfide desorption; Sampling and analytical protocol shall proceed in accordance with OSHA Method #07, or NIOSH Method #1022 or #1003.	OSHA: 50 ppm 200 ppm (Ceiling) ACGIH: 50 ppm 100 ppm STEL NIOSH: 25 ppm IDLH: 1000 ppm	Inadequate - Odor threshold 82 ppm. APRs with organic vapor/acid gas cartridges may be used for escape purposes. Exceedances over the exposure limits require the use of positive pressure-demand supplied air respirator. **Recommended gloves:** PV Alcohol unsupported >16.00 hrs; Silver shield >6.00 hrs; Teflon >24.00 hrs; or Viton >24.00 hrs; Nitrile (Useable time limit 0.5 hr, complete submersion for the nitrile selection)	**Boiling Pt:** 188°F; 86.7°C **Melting Pt:** -99°F; -73°C **Solubility:** 0.1% @ 77°F; 25°C **Flash Pt:** 90°F; 32°C **LEL/LFL:** 8% @ 77°F; 25°C **UEL/UFL:** 10.5 @ 77°F; 25°C **Vapor Density:** 4.53 **Vapor Pressure:** 100 mmHg @ 90°F; 32° C **Specific Gravity:** 1.46 **Incompatibilities:** Strong caustics and alkalis, chemically active metals (barium, lithium, sodium, magnesium, titanium, and beryllium) **Appearance and Odor:** Colorless liquid with a chloroform type odor. Combustible liquid, however, burns with difficulty.	Central nervous system effects including euphoria, analgesia, anesthesia, paresthesia, headaches, tremors, vertigo, and somnolence. Damage to the liver, kidneys, heart, lungs, and skin have also been reported. Contact may result in irritation to the eyes, skin, and mucous membranes. Ingestion may result in GI disturbances including nausea, and vomiting NIOSH lists this substance a potential human carcinogen.

Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Tetrachloroethylene See also Perchloroethylene PERK PCE	127-18-4	PID: I.P. 9.32 eV, relative response ratio 200% with 10.6 eV lamp. FID: 70% relative response ratio with a FID.	Air sample using charcoal tube; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol shall proceed in accordance with OSHA Method #07, or NIOSH Method #1003.	ACGIH: 25 ppm 100 ppm STEL OSHA: 100 ppm 200 ppm Ceiling; 300 ppm 5-minute max peak in any 3-hr period. IDLH: 150 ppm	Odor threshold for this substance has been determined to be at airborne concentrations of approximately 47 ppm, which is considered adequate. APR with organic vapor/acid gas cartridges should be used for escape purposes only. Exceedances over the recommended exposure limits requires the use of airline or airline/APR combination units. **Recommended glove:** Viton, PV alcohol 5-16 hrs; silver shield >6.00 hrs; teflon 10-24 hrs; and Nitrile in that order. The breakthrough time for the nitrile glove ranges between 1.5 - 5.5 hrs. during complete immersion.	**Boiling Pt:** 250°F; 121°C **Melting Pt:** -2°F; 19°C **Solubility:** 0.02% **Flash Pt:** Not available **LEL/LFL:** Not available **UEL/UFL:** Not available **Vapor Density:** 5.83 **Vapor Pressure:** 14 mmHg @ 77°F; 25° C **Specific Gravity:** 1.62 @ 77°F; 25°C **Incompatibilities:** Strong oxidizers, alkalis, fuming sulfuric acid, and chemically active metals. When heated to decomposition temperatures will emit toxic fumes of chlorine. **Appearance and Odor:** Colorless liquid with a mild chloroform like odor.	Overexposure may result in irritation to eyes, nose, throat, and skin. Potential CNS effects including sleepiness, incoordination, headaches, hallucinations, distorted perceptions, and stupor (narcosis). Systemically, symptoms may result in nausea, vomiting, weakness, tremors, and cramps. Chronic exposures may result in dermatitis, enlarged tender liver, kidney, and lung damage. This material is considered a animal carcinogen (liver tumors), however, inadequate evidence exists concerning carcinogenic potential in humans.
General PAHs / Coal Tar Pitch Volatiles / Creosote / cresol (Fluoranthene, pyrene, benzo(a) anthracene, benzo(a) pyrene, benzo(f)fluoranthene, benzo(k)fluoranthene), etc.)	(CAS Numbers vary depending on specific compound)	PID: I.P. of 8.97 eV, relative response ratio unknown. FID: Response factor unknown but given the substances flammability, detection by FID can be anticipated.	Refer to NIOSH methods for each specfic compound for appropriate air sampling protocols. Many PAHs can be sampled using <u>NIOSH Method 5506 or 5515</u> - Teflon filter with support ring - High pressure liquid chromatography with UV detector. For cresol (a major constituent of creosote) by silica gel or xad-7 sorbent tube; Acetone desorption and analysis by GC/FID or high-pressure liquid chromatography. (NIOSH Method #2001, or OSHA Method #32)	**General PAHs:** Most PAHs have no established exposure limits. Other Coal Tar Pitch Volatiles / PAHs such as chrysene and benzo(a)pyrene have an exposure limit of 0.2 mg/m³ (OSHA and ACGIH). 0.1 mg/m³ - (NIOSH) **Creosote / Cresol:** OSHA; ACGIH: 5 ppm NIOSH: 2.3 ppm IDLH: 80 mg/m³	Adequate - use a full-face air-purifying respirator with organic vapor / dust/mist cartridge up to 250 ppm. Cresol has an Odor Threshold of 0.00005-0.0079 ppm. **Recommended gloves:** Viton >96.00 hrs; butyl rubber >90.00 hrs; neoprene >4.50 hrs	Properties of various PAHs/Coal Tar Pitch Volatiles vary depending upon the specific compound. *<u>For Creosote/Cresol:</u>* **Boiling Pt:** 376-397°F; 191-203°C **Melting Pt:** 52-96°F; 10.9-35.5°C **Solubility:** Insoluble **Flash Pt:** 178°F; 81°C **LEL/LFL:** Not available **UEL/UFL:** Not available **Vapor Density:** 3.72 **Vapor Pressure:** 1 mmHg @ 100-127° F; 38-53°C **Specific Gravity:** 1.030-1.038 **Incompatibilities:** Nitric acid, oleum, chlorosulfonic acid, oxidizers **Appearance and Odor:** Yellowish or colorless, flammable, oily liquid (often brownish because of impurities or oxidation)	Regulated based on effects on respiratory tract and skin irritation Other effects may include eye irritiation and central nervous system, distrubances. Acute exposures may result in difficulty breathing, respiratory failure and skin and eye irritation and burns. Chronic exposure may damage the liver, kidneys, lungs and skin and cause photosensitivity. IARC, NTP, NIOSH, ACGIH, and the EPA list some PAHs such as benzo(a)pyrene as a potential carcinogen (ARC 2A, NTP-2, ACGIH TLV-A2, NIOSH-X, EPA-B2).

TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAVAL STATION, MAYPORT, FLORIDA
PAGE 3

Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Gasoline	8006-61-9	Relative response ratios for the components of gasoline range from 100 - 200% for PID and FID detection.	See components for measurement considerations.	ACGIH & OSHA: 300 ppm 500 ppm STEL NIOSH: Reduce to lowest feasible concentration.	**Respiratory Protection:** Odor threshold 0.7 ppm, adequate air purifying respirator with organic vapor cartridges up to 100 ppm. **Recommended Gloves:** Nitrile >6.00 hrs; PV alcohol >6.00 hrs; Viton/neoprene >8.00 hrs	**Boiling Pt:** 102°F; 39°C **Melting Pt:** Not available **Solubility:** Negligible **Flash Pt:** -50°F; -45°C **LEL/LFL:** 1.4% **UEL/UFL:** 7.6% **Vapor Density:** ~5 **Vapor Pressure:** 38-300 mmHg (varies seasonally) **Specific Gravity:** 0.74 @ 20/20°C **Incompatibilities:** Strong oxidizers, peroxides, strong acids, and perchlorates **Appearance and Odor:** Colorless liquid with gasoline odor.	Overexposure to this substance may result in irritation to the eyes, skin, and mucous membranes. Systemically, headache, fatigue, blurred vision, dizziness, slurred speech, confusion, possible convulsion, and chemical pneumonia (aspiration). Prolonged or chronic exposures may result in possible liver or kidney damage. Components of this substance have been determined to be confirmed human carcinogens.
Aroclor-1260 (Polychlorinated Biphenyl, PCB) It should be noted that this substance is representative of the more common isomers Aroclor - 1242, 1254, which may be encountered.	11096-82-5 53469-21-9 (42%) 11097-69-1 (54%)	Substance is not volatile (VP=0.00006 mmHg), I.P. is unknown however is anticipated to be elevated, therefore, PID is not anticipated to detect substance. Substance is non combustible and as a result will not be detected by FID.	Air sample using a particulate filter, Florisil sorbent tube with glass fiber filter; hexane desorption; gas chromatography-electron capture detector. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #5503 (PCBs).	OSHA; ACGIH: 0.5 mg/m³ (skin) NIOSH: 0.001 mg/m³ IDLH: 5 mg/m³	Inadequate - However due to the low volatility it is assumed unless agitated this substance does not present a volatile vapor or gas respiratory threat. For dusty conditions where this material may cling to particulates, use a HEPA filter. APRs are approved for escape only when concentrations exceed the exposure limits. Concentrations greater than the exposure limits require PAPR or supplied air respirators. **Recommended glove:** Butyl rubber >24 hrs; Neoprene rubber >24.00 hrs; Silver shield or Viton (for pure product).	**Boiling Pt:** distillation range 689- 734°F; 365-390°C **Melting Pt:** -2 to 50°F; -19 to 10°C **Solubility:** Insoluble **Flash Pt:** Not applicable **LEL/LFL:** Not applicable **UEL/UFL:** Not applicable Nonflammable liquid, however, exposure to fire results in black soot containing PCBs, dibenzofurans, & chlorinated dibenzo-p-dioxins **Vapor Density:** Not available **Vapor Pressure:** 0.00006 - 0.001 mmHg **Specific Gravity:** 1.566 @ 60°F; 15.5°C **Incompatibilities:** Strong oxidizers **Appearance and Odor:** Colorless to pale yellow, viscous liquid or solid (Aroclor 54 below 50°F) with a mild, hydrocarbon odor	This substance is irritating to the eyes and skin. Chronic effects of overexposure may include potential to cause liver damage, chloracne, and reproductive effects. Recognized as possessing carcinogenic properties by NIOSH, and NTP.

6.2 PHYSICAL HAZARDS

The physical hazards that may be present during the performance of site activities are summarized below:

- Heavy equipment hazards (pinch/compression points, rotating equipment, etc.).
- Slips, trips, and falls
- Energized systems (contact with underground or overhead utilities)
- Lifting (strain/muscle pulls)
- Noise in excess of 85 decibels (dBA)
- Working over or near water
- Flying projectiles
- Ambient temperature extremes (heat stress)
- Pinches and compressions
- Vehicular and foot traffic

These physical hazards are discussed in Table 5-1 as applicable to each site task. Further, many of these hazard are discussed in detail in Section 4.0 of the Health and Safety Guidance Manual. Specific discussions on some of these hazards are presented below.

6.2.1 Heavy Equipment Hazards (Pinch/compression points, rotating equipment, etc.)

Often the hazards associated with drilling operations are the most dangerous to be encountered during site activities. The SSO will thoroughly discuss safe drilling procedures during the pre-activities training session. All site personnel will sign the form in Figure 8-2 documenting that they received the training and understand the procedures. The following rules will apply to all drilling operations:

- Emergency stop devices (if applicable) will be tested daily to ensure that they are operational.

- Long handled shovels or equivalent shall be used to clear cuttings from the borehole and rotating equipment.

- The driller may not leave the controls when the augers are rotating.

6.2.2 Energized Systems (Contact with Underground or Overhead Utilities)

Underground utilities such as pressurized lines, water lines, telephone lines, buried utility lines, and high voltage power lines may be present throughout the facility. Clearance of underground and overhead utilities for each sample location will be coordinated with NAVSTA Mayport personnel. Additionally, drilling operations will be conducted at a safe distance (>20 feet) from overhead power lines. Whenever underground utilities are suspected to be close to subsurface sampling locations, the borehole will be advanced to a minimum of five (5) feet with a hand auger prior to drilling. As built drawings may also be utilized for additional clarification. In certain cases, Base personnel may need to deenergize electrical cables using facility lockout/tagout procedures to insure electrical hazards are eliminated.

6.2.3 Ambient Temperature Extremes

Overexposure to high ambient temperatures (heat stress) may exist during performance of this work depending on the project schedule. Extremely cold temperatures are not expected to be encountered due to project location. Work performed when ambient temperatures exceed 70°F may result in varying levels of heat stress (heat rash, heat cramps, heat exhaustion, and/or heat stroke) depending on variables such as wind speed, humidity, and percent sunshine, as well as physiological factors such as metabolic rate and skin moisture content. Additionally, work load and level of protective equipment will affect the degree of exposure. Site personnel will be encouraged to drink plenty of fluids to replace those lost through perspiration. Additional information such as Work-Rest Regimens and personnel monitoring may be found in Section 4.0 of the Health & Safety Guidance Manual. The SSO will recommend additional heat stress control measures as they are deemed necessary as per ACGIH guidelines.

6.3 NATURAL HAZARDS

Insect/animal bites and stings, inclement weather, and other natural hazards must be considered given the location of activities to be conducted. In general, avoidance of areas of known infestation or nesting will be the preferred exposure control. Use of additional PPE with joints (ankles and wrists) taped, such as long pants tucked into boots or coveralls, is also recommended. Specific discussion on principle hazards of concern follows:

6.3.1 Fire Ants

Fire ants present a unique situation when working outdoors in Florida. Their aggressive behavior and their ability to sting repeatedly can pose a unique health threat. The sting injects a venom that causes an extreme burning sensation. Pustules form which can become infected if scratched. Allergic reactions of people sensitive to the venom include dizziness, swelling, shock and in extreme cases unconsciousness and death. People exhibiting such symptoms should see a physician.

Fire ants can be identified by their habitat. They build mounds in open sunny areas sometimes supported by a wall or shrub. The mound has no external opening. The size of the mound can range from a few inches across to some which are in excess of two feet or more in height and diameter. When disturbed they defend it by swarming out and over the mound, even running up grass blades and sticks.

6.3.2 Snakes, Insects, and Other Animals

The site is suspected of supporting a large population of eastern diamondback rattlesnakes. Given that areas to be investigated could be prime nesting and/or hiding locations for snakes and insects, precautions will be taken when opening manholes and other access doors. When possible, doors and manhole covers will be opened away from personnel to allow snakes or insects to escape. Personnel should avoid reaching into areas that are not visibly clear of snakes or insects. Snake chaps will be worn in areas of known or anticipated snake infestation. All site personnel who are allergic to stinging insects such as bees, wasps, and hornets must be particularly careful since severe illness and death may result from allergic reactions. As with any medical condition or allergy, information regarding the condition must be listed on the Medical Data Sheet and the FOL and SSO notified.

There are various areas throughout the U.S. where Lyme Disease is endemic. Fortunately, Florida is not one of these areas. Nonetheless, personnel should be aware of the hazards of tick bites and Lyme Disease. The longer a disease carrying tick remains attached to the body, the greater the potential for contracting the disease. Wearing long sleeved shirts and long pants (tucked into boots). As well as performing frequent body checks will prevent long term attachment. Site first aid kits should be equipped with medical forceps and rubbing alcohol to assist in tick removal. For information regarding tick removal procedures, and symptoms of exposure consult Attachment II of this HASP or Section 4.0 of the Health and Safety Guidance Manual.

An Office of Natural Resources or similar entity on Base should be contacted for further direction on the hazards and precautions of naturally occurring wildlife and insects.

6.3.3 Inclement Weather

Project tasks under this Scope of Work will be performed outdoors and near water. As a result, inclement weather may be encountered. In the event that adverse weather conditions arise (electrical storms, hurricanes, etc.), the FOL and/or the SSO will be responsible for temporarily suspending or terminating activities until hazardous conditions no longer exist.

7.0 AIR MONITORING

Direct reading instruments will be used at the site to detect and evaluate the presence of site contaminants and other potentially hazardous conditions. As a result, specific air monitoring measures and requirements are established in Table 5-1 pertaining to the specific hazards and tasks of an identified operation. Additionally, the Health and Safety Guidance Manual, Section 1.0, contains detailed information regarding direct reading instrumentation, as well as general calibration procedures of various instruments.

7.1 INSTRUMENTS AND USE

Instruments will be used primarily to monitor source points and worker breathing zone areas, while observing instrument action levels. Action levels are discussed in Table 5-1 as they may apply to a specific task or location.

7.1.1 Photoionization Detector or Flame Ionization Detector

In order to accurately monitor for any substances which may present an exposure potential to site personnel, a Photoionization Detector (PID) using a lamp energy of 10.6 eV or higher will be used. This instrument will be used to monitor potential source areas and to screen the breathing zones of employees during site activities. The PID has been selected because it is capable of detecting the organic vapors of concern (NOTE: A Flame Ionization Detector [FID] may be used as an alternative to the PID).

Prior to the commencement of any field activities, the background levels of the site must be determined and noted. Daily background readings will be taken away from any areas of potential contamination. These readings, any influencing conditions (i.e., weather, temperature, humidity) and site location must be documented in the field operations logbook or other site documentation (e.g., sample log sheet).

7.1.2 Hazard Monitoring Frequency

Table 5-1 presents the frequencies that hazard monitoring will be performed as well as the action levels which will initiate the use of elevated levels of protection. The SSO may decide to increases these frequencies based on instrument responses and site observations. The frequency at which monitoring is performed will not be reduced without the prior consent of the PHSO or HSM.

7.2 INSTRUMENT MAINTENANCE AND CALIBRATION

Hazard monitoring instruments will be maintained and pre-field calibrated by the TtNUS Equipment Manager. Operational checks and field calibration will be performed on all instruments each day prior to their use. Field calibration will be performed on instruments according to manufacturer's recommendations (for example, the PID must be field calibrated daily and an additional field calibration must be performed at the end of each day to determine any significant instrument drift). These operational checks and calibration efforts will be performed in a manner that complies with the employees health and safety training, the manufacturer's recommendations, and with the applicable manufacturer standard operating procedure (copies of which can be found in the Health & Safety Guidance Manual which will be maintained on site for reference). All calibration efforts must be documented. Figure 7-1 is provided for documenting these calibration efforts. This information may instead be recorded in a field operations logbook, provided that all of the information specified in Figure 7-1 is recorded. This required information includes the following:

- Date calibration was performed
- Individual calibrating the instrument
- Instrument name, model, and serial number
- Any relevant instrument settings and resultant readings (before and after) calibration
- Identification of the calibration standard (lot no., source concentration, supplier)
- Any relevant comments or remarks

FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: ______________________ PROJECT NO.:__________

Date of Calibration	Instrument Name and Model	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot Number)	Remarks/ Comments
				Pre-Calibration	Post-Calibration	Pre-Calibration	Post-Calibration		

8.0 TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS

8.1 INTRODUCTORY/REFRESHER/SUPERVISORY TRAINING

This section is included to specify health and safety training and medical surveillance requirements for both TtNUS and subcontractor personnel participating in site activities.

8.1.1 Requirements for TtNUS Personnel

All TtNUS personnel must complete 40 hours of introductory hazardous waste site training prior to performing work at NAVSTA Mayport. Additionally, TtNUS personnel who have had introductory training more than 12 months prior to site work must have completed 8 hours of refresher training within the past 12 months before being cleared for site work. In addition, 8-hour supervisory training in accordance with 29 CFR 1910.120(e)(4) will be required for site supervisory personnel.

Documentation of TtNUS introductory, supervisory, and refresher training as well as site-specific training will be maintained at the project. Copies of certificates or other official documentation will be used to fulfill this requirement.

TtNUS will conduct a pre-activities training session prior to initiating site work. Additionally, a brief meeting will be held daily to discuss operations planned for that day. At the end of the workday, a short meeting will be held to discuss the operations completed and any problems encountered. This activity will be supported through the use of a Safe Work Permit System (See Section 10.10).

8.1.2 Requirements for Subcontractors

All TtNUS subcontractor personnel must have completed introductory hazardous waste site training or equivalent work experience as defined in OSHA Standard 29 CFR 1910.120(e) and 8 hours of refresher training meeting the requirements of 29 CFR 1910.120(e)(8) prior to performing field work at NAVSTA Mayport. TtNUS subcontractors must certify that each employee has had such training by sending TtNUS a letter, on company letterhead, containing the information in the example letter provided in Figure 8-1 and by providing copies of certificates for all subcontractor personnel participating in site activities.

FIGURE 8-1

TRAINING LETTER

The following statements must be typed on company letterhead, signed by an officer of the company and accompanied by copies of personnel training certificates:

LOGO
XYZ CORPORATION
555 E. 5th Street
Nowheresville, Kansas 55555

Month, day, year

Mr. Terry Hansen
Task Order Manager
Tetra Tech NUS, Inc.
1311 Executive Center Drive, Suite 220
Tallahassee, Florida 32301

Subject: HAZWOPER Training for NAVSTA Mayport, Mayport, Florida

Dear Mr. Hansen:

As an officer of XYZ Corporation, I hereby state that I am aware of the potential hazardous nature of the subject project. I also understand that it is our responsibility to comply with all applicable occupational safety and health regulations, including those stipulated in Title 29 of the Code of Federal Regulations (CFR), Parts 1900 through 1910 and Part 1926.

I also understand that Title 29 CFR 1910.120, entitled "Hazardous Waste Operations and Emergency Response," requires an appropriate level of training for certain employees engaged in hazardous waste operations. In this regard, I hereby state that the following employees have had 40 hours of introductory hazardous waste site training or equivalent work experience as requested by 29 CFR 1910.120(e) and have had 8 hours of refresher training as applicable and as required by 29 CFR 1910.120(e)(8) and that site supervisory personnel have had training in accordance with 29 CFR 1910.120(e)(4).

LIST FULL NAMES OF EMPLOYEES AND THEIR SOCIAL SECURITY NUMBERS HERE.

Should you have any questions, please contact me at (555) 555-5555.

Sincerely,

(Name and Title of Company Officer)

8.2 SITE-SPECIFIC TRAINING

TtNUS will provide site-specific training to all site personnel who will perform work on this project. Site-specific training will also be provided to all personnel [U.S. Department of Defense (DOD), EPA, etc.] who may enter the site to perform functions that may or may not be directly related to site operations. Site-specific training will include:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Contents of the Health and Safety Plan
- Emergency response procedures (evacuation and assembly points)
- Spill response procedures
- Review of the contents of relevant Material Safety Data Sheets

Site-specific documentation will be established through the use of Figure 8-2. All site personnel and visitors must sign this document upon receiving site-specific training.

8.3 MEDICAL SURVEILLANCE

8.3.1 <u>Medical Surveillance Requirements for TtNUS Personnel</u>

All TtNUS personnel participating in project field activities will have had a physical examination meeting the requirements of TtNUS's medical surveillance program and will be medically qualified to perform hazardous waste site work using respiratory protection

Documentation for medical clearances will be maintained in the TtNUS Pittsburgh office and made available, as necessary.

FIGURE 8-2

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing remedial investigation activities at NAVSTA Mayport in Mayport, Florida, and that I have received site-specific training that included the elements presented below:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Contents of the Health and Safety Plan
- Emergency response procedures (evacuation and assembly points)
- Spill response procedures
- Review of contents of relevant Material Safety Data Sheets

My signature below indicates that I have been given the opportunity to ask questions and that all of my questions have been answered to my satisfaction, and that the dates of my training and medical surveillance indicated below are accurate.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam

8.3.2 Medical Surveillance Requirements for Subcontractors

Subcontractors are required to obtain a certificate of their ability to perform hazardous waste site work and to wear respiratory protection. The "Subcontractor Medical Approval Form" provided in Figure 8-3 shall be used to satisfy this requirement, providing it is properly completed and signed by a licensed physician.

Subcontractors who have a company medical surveillance program meeting the requirements of paragraph (f) of OSHA 29 CFR 1910.120 can substitute "Subcontractor Medical Approval Form" with a letter, on company letterhead, containing all of the information in the example letter presented in Figure 8-4 of this HASP.

8.3.3 Requirements for All Field Personnel

Each field team member (including subcontractors) and visitors entering the exclusion zone(s) shall be required to complete and submit a copy of Medical Data Sheet presented in Section 7 of the Health and Safety Guidance Manual. This shall be provided to the SSO, prior to participating in site activities. The purpose of this document is to provide site personnel and emergency responders with additional information that may be necessary in order to administer medical attention.

8.4 SUBCONTRACTOR EXCEPTIONS

Subcontractors who will not enter the exclusion zone during operation, and whose activities involve no potential for exposure to site contaminants, will not be required to meet the requirements for training/medical surveillance other than site-specific training as stipulated in Section 8.2.

FIGURE 8-3
SUBCONTRACTOR MEDICAL APPROVAL FORM

For employees of ____
Company Name

Participant Name: ____________________________ Date of Exam: ___________________

Part A

The above-named individual has:

1. Undergone a physical examination in accordance with OSHA Standard 29 CFR 1910.120, paragraph (f), and was found to be medically -

   ( ) qualified to perform work at the NAVSTA Mayport work site
   ( ) not qualified to perform work at the NAVSTA Mayport work site

and,

2. Undergone a physical examination in accordance with OSHA 29 CFR 1910.134(b)(10) and was found to be medically -

   ( ) qualified to wear respiratory protection
   ( ) not qualified to wear respiratory protection

My evaluation has been based on the following information, as provided to me by the employer.

( ) A copy of OSHA Standard 29 CFR 1910.120 and appendices.
( ) A description of the employee's duties as they relate to the employee's exposures.
( ) A list of known/suspected contaminants and their concentrations (if known).
( ) A description of any personal protective equipment used or to be used.
( ) Information from previous medical examinations of the employee that is not readily available to the examining physician.

Part B

I, ______________________________, have examined ______________________________
Physician's Name (print) Participant's Name (print)

and have determined the following information:

FIGURE 8-3
SUBCONTRACTOR MEDICAL APPROVAL FORM

PAGE TWO

1. Results of the medical examination and tests (excluding finding or diagnoses unrelated to occupational exposure):

    ____
    ____
    ____

2. Any detected medical conditions which would place the employee at increased risk of material impairment of the employee's health:

    ____
    ____
    ____

3. Recommended limitations upon the employee's assigned work:

    ____
    ____
    ____

I have informed this participant of the results of this medical examination and any medical conditions which require further examination of treatment.

Based on the information provided to me, and in view of the activities and hazard potentials involved at the NAVSTA Mayport work site, this participant

( ) may
( ) may not

perform his/her assigned task.

Physician's Signature ______________________

Address ______________________

Phone Number ______________________

NOTE: Copies of test results are maintained and available at:

____
Address

FIGURE 8-4

MEDICAL SURVEILLANCE LETTER

The following statements must be typed on company letterhead and signed by an officer of the company:

LOGO
XYZ CORPORATION
555 E. 5th Street
Nowheresville, Kansas 55555

Month, day, year

Mr. Terry Hansen
Task Order Manager
Tetra Tech NUS, Inc.
1311 Executive Center Drive, Suite 220
Tallahassee, Florida 32301

Subject: Medical Surveillance for NAVSTA Mayport, Mayport, Florida

Dear Mr. Hansen:

As an officer of XYZ Corporation, I hereby state that the persons listed below participate in a medical surveillance program meeting the requirements contained in paragraph (f) of Title 29 of the Code of Federal Regulations (CFR), Part 1910.120, entitled "Hazardous Waste Operations and Emergency Response: Final Rule." I further state that the persons listed below have had physical examinations under this program within the past 12 months and that they have been cleared, by a licensed physician, to perform hazardous waste site work and to wear positive- and negative-pressure respiratory protection. I also state that, to my knowledge, no person listed below has any medical restriction that would preclude him/her from working at the NAVSTA Mayport, Mayport, Florida site.

LIST FULL NAMES OF EMPLOYEES AND THEIR SOCIAL SECURITY NUMBERS HERE.

Should you have any questions, please contact me at (555) 555-5555.

Sincerely,

(Name and Title of Company Officer)

9.0 SPILL CONTAINMENT PROGRAM

9.1 SCOPE AND APPLICATION

It is anticipated that quantities of bulk potentially hazardous materials (greater than 55-gallons) may be handled during some of the site activities conducted as part of the scope of work (specifically Investigative-Derived Wastes [IDW]). It is not anticipated, however, that spillage of these materials would constitute a significant danger to human health or the environment. Further, it is possible that as the job progresses disposable PPE and other non-reusable items may be generated. As needed, 55 -gallon drums will be used to contain waste waters, IDW, and other unwanted items generated during investigatory activities. These drums will be labeled with the site name and address, the type of contents, and the date the container was filled as well as an identified contact person. Samples will be collected and analyzed to characterize the material and determine appropriate disposal measures. Once characterized they can be removed from the staging area and disposed of in accordance with Federal, State, and local regulations. Table 5-1 contains detailed information about handling IDW at NAVSTA Mayport.

9.2 POTENTIAL SPILL AREAS

Potential spill areas will be monitored in an ongoing attempt to prevent and control further potential contamination of the environment. Currently, there are various areas vulnerable to this hazard including the areas used for central staging and decontamination activities. Additionally, areas designated for handling, loading, and unloading of potentially contaminated soils, waters, and debris present limited potential for leaks or spills. It is anticipated that all IDW generated as a result of this scope of work will be containerized, labeled, and staged to await chemical analyses. The results of these analyses will determine appropriate disposal methods.

9.2.1 <u>Site Drums/Containers</u>

All drums/containers used for containing soils and liquids will be sealed, labeled, and staged within a centralized area awaiting shipment or disposal.

9.3 LEAK AND SPILL DETECTION

To establish an early detection of potential spills or leaks, periodic inspections by the SSO will be conducted during working hours to visually determine that containers are not leaking. If a leak is detected, the first approach will be to transfer the container contents using a hand pump into a new container. Other provisions for the transfer of container contents will be made and appropriate emergency contacts will be notified, if necessary. In most instances, leaks will be collected and contained using absorbents such as Oil-dry, vermiculite, or sand, which will be stored at the staging area in a conspicuously marked drum. This material too, will be containerized for disposal pending analyses. All inspections will be documented in the Project Logbook.

9.4 PERSONNEL TRAINING AND SPILL PREVENTION

All personnel will be instructed on the procedures for spill prevention, containment, and collection of hazardous materials in the site-specific training. The FOL and/or the SSO will serve as the Spill Response Coordinator for this operation should the need arise.

9.5 SPILL PREVENTION AND CONTAINMENT EQUIPMENT

The following represents the types of equipment that may be maintained at the staging area for the purpose of supporting this Spill Prevention/Containment Program.

- Sand, clean fill, vermiculite, or other noncombustible absorbent (oil-dry);
- Drums (55-gallon U.S. DOT 17-E or 17-H)
- Shovels, rakes, and brooms
- Labels

9.6 SPILL CONTROL PLAN

This section describes the procedures the TtNUS field crewmembers will employ upon the detection of a spill or leak.

1) Notify the SSO or FOL immediately.

2) Employ the personnel protective equipment stored at the staging area. Take immediate actions to stop the leak or spill by plugging or patching the drum or raising the leak to the highest point. Spread the absorbent material in the area of the spill covering completely.

3) Transfer the material to a new container, collect and containerize the absorbent material. Label the new container appropriately. Await analyses for treatment or disposal options.

4) All spills will be recontainerized with 2-inches of top cover, and await test results for treatment or disposal options.

It is not anticipated that a spill will occur in which the field crews cannot handle. Should this occur; however, notification of appropriate emergency response agencies will be carried out by the FOL or SSO.

10.0 SITE CONTROL

This section outlines the means by which TtNUS will delineate work zones and use these work zones in conjunction with decontamination procedures to prevent the spread of contaminants into previously unaffected areas of the site. It is anticipated that a three-zone approach will be used during work at this site. This three zone approach will utilize an exclusion zone, a contamination reduction zone, and a support zone. It is also anticipated that this control measure will be used to control access to site work areas. Use of such controls will restrict the general public, minimize the potential for the spread of contaminants, and protect individuals who are not cleared to enter work areas.

10.1 EXCLUSION ZONE

The exclusion zone will be considered those areas of the site of known or suspected contamination. It is not anticipated that significant amounts of surface contamination are present in the proposed work areas of this site. It is anticipated that this will remain so until/unless contaminants are brought to the surface by intrusive activities, such as soil boring or sampling operations. Furthermore, once intrusive activities have been completed and surface contamination has been removed, the potential for exposure is again diminished and the area can then be reclassified as part of the contamination reduction zone. Therefore, the exclusion zones for this project will be limited to those areas of the site where active work is being performed plus a designated area surrounding the point of operation (see Table 5-1 for specific operation). When possible, exclusion zones will be delineated using barrier tape, cones and/or drive poles, and postings to inform site personnel.

10.1.1 Exclusion Zone Clearance

Prior to the initiation of site activities, utility locations will be identified by utility companies contacted through the NAVSTA Mayport Base Contact – Randy Bishop at (904) 270-6730. Additional utility surveys may be conducted by TtNUS through the use of available documentation provided by NAVSTA Mayport and/or local utility companies. The positions of identified utilities will be field located and staked to minimize the potential for damage during intrusive activities. Sample locations can be located to avoid buried utilities. In the event that a utility is struck during a subsurface investigative activity, the emergency numbers provided in Table 2-1 will be notified.

Access to work areas will be controlled by TtNUS personnel. No personnel will be permitted to enter site exclusion zones without site-specific training. Site visitors will be provided site-specific training and will be escorted by TtNUS personnel at all times (see section 10.4).

10.2 CONTAMINATION REDUCTION ZONE

The contamination reduction zone (CRZ) will be a buffer area between the exclusion zone and any area of the site where contamination is not suspected. The personnel and equipment decontamination will not take place in this area, but will take place at a central location established for this project. This area instead will serve as a focal point in supporting exclusion zone activities. When applicable, this area will be delineated using barrier tape, cones and/or drive poles, and postings to inform and direct facility personnel.

10.3 SUPPORT ZONE

The support zone for this project will include a staging area where site vehicles will be parked, equipment will be unloaded, and where food and drink containers will be maintained. In all cases, the support zones will be established at areas of the site where exposure to site contaminants would not be expected during normal working conditions or foreseeable emergencies.

10.4 SITE VISITORS

Site visitors for the purpose of this document are identified as representing the following groups of individuals:

- Personnel invited to observe or participate in operations by TtNUS
- Regulatory personnel (EPA, OSHA, etc.)
- NAVSTA Mayport personnel
- Other authorized visitors

All personnel working on this project are required to gain initial access to the site by coordinating with the TtNUS FOL or designee and following established site access procedures.

Upon gaining access to the site, all site visitors wishing to observe operations in progress will be escorted by a TtNUS representative (arranged for by the FOL) and shall be required to meet the minimum requirements discussed below:

- All site visitors will be routed to the FOL, who will sign them into the field logbook. Information to be recorded in the logbook will include the individual's name (proper identification required), the entity which they represent, and the purpose of the visit.

- All site visitors will be required to produce the necessary information supporting clearance to the site. This shall include information attesting to applicable training (40-hours of HAZWOPER training) and medical surveillance as stipulated in Section 8.0 of this document. In addition, to enter the site operational zones during planned activities, all visitors will be required to first go through site-specific training covering the topics stipulated in Section 6.2 of this HASP.

Once the site visitors have completed the above items, they will be permitted to enter the operational zone. All visitors are required to observe the protective equipment and site restrictions in effect at the site at the time of their visit. Any and all visitors not meeting the requirements stipulated in this plan will not be permitted to enter the site operational zones during planned activities. Any incidence of unauthorized site visitation will cause the termination of all onsite activities until the unauthorized visitor is removed from the premises. Removal of unauthorized visitors will be accomplished with support from the FOL, SSO or on-site security personnel.

10.5 SITE SECURITY

Site security will be accomplished using existing base security resources and procedures, supplemented by TtNUS or subcontractor personnel, if necessary. TtNUS will retain control over active operational areas. The first line of security will take place at the base boundaries restricting the general public. The second line of security will take place at the work site referring interested parties to the FOL. The FOL will serve as a focal point for site personnel, and will serve and the final line of security and the primary enforcement contact.

10.6 SITE MAPS

Once the areas of contamination, access routes, utilities, topography, and dispersion routes are determined, a site map will be generated and adjusted as site conditions change. These maps will show utility locations, potential points of contact with the public, roadways, and other significant characteristics that may impact site operations and safety. Site maps will be posted to illustrate up-to-date collection of contaminants and adjustment of zones and access points.

10.7 BUDDY SYSTEM

Personnel engaged in onsite activities will practice the "buddy system" to ensure the safety during this operation.

10.8 MATERIAL SAFETY DATA SHEET (MSDS) REQUIREMENTS

TtNUS and subcontractor personnel will provide MSDSs for all chemicals brought on site. The contents of these documents will be reviewed by the SSO with the user(s) of the chemical substances prior to any actual use or application of the substances on site. A chemical inventory of all chemicals used on site will be developed using Section 5.0 of the Health and Safety Guidance Manual. The MSDSs will then be maintained in a central location and will be available for anyone to review upon request.

10.9 COMMUNICATION

TtNUS personnel will be working in close proximity to each other at NAVSTA Mayport. As a result and since two way radio communication will not be available, hand signals, voice commands, and line of site will provide sufficient means of communication. When project tasks are performed simultaneously on different sites, vehicle horns will be used to communicate emergency situations per Section 2.6 of this HASP.

External communication will be accomplished by using provided telephones at the site. External communication will primarily be used for the purpose of resource and emergency resource communications.

10.10 SAFE WORK PERMITS

All exclusion zone work conducted in support of this project will be performed using Safe Work Permits to guide and direct field crews on a task by task basis. An example of the Safe Work Permit to be used is illustrated in Figure 10-1. Partially completed Permits for exclusion zone tasks are included as Attachment IV of this HASP. These work permits will be further supported by the daily meetings conducted during their generation. This effort will ensure all site-specific considerations and changing conditions are incorporated into the planning effort.

Use of these permits will provide the communication line for reviewing protective measures and hazards associated with each operation. This HASP will be used as the primary reference for selecting levels of protection and control measures. The work permit will take precedence over the HASP when more conservative measures are required based on specific site conditions.

The FOL and/or the SSO will be responsible for completing the safe work permit and issuing them to the appropriate parties. Site personnel at the end of each days activity will turn in the permit(s) used for that day to the SSO. All permits will be maintained as part of the permanent project files attesting to safety and health measures employed for a given task at a given time and place. Any problems encountered with the protective measures required should be documented on the permit and brought to the attention of the SSO.

FIGURE 10-1
SAFE WORK PERMIT

Permit No. ____________ Date: ________________ Time: From __________ to __________

SECTION I: General Job Scope (To be filled in by person performing work)

I. Work limited to the following (description, area, equipment used): ______________________

II. Names: ______________________

III. Onsite Inspection conducted ☐ Yes ☐ No Initials of Inspector ________ ________
TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

IV. Protective equipment required
Level D ☐ Level B ☐
Level C ☐ Level A ☐
Detailed on Reverse

Respiratory equipment required
Full face APR ☐ Escape Pack ☐
Half face APR ☐ SCBA ☐
SKA-PAC SAR ☐ Bottle Trailer ☐
Skid Rig ☐ None ☐

Modifications/Exceptions: ______________________

V. Chemicals of Concern | Action Level(s) | Response Measures

VI. Additional Safety Equipment/Procedures
Hardhat............................☐ Yes ☐ No
Safety Glasses.................☐ Yes ☐ No
Chemical/splash goggles..☐ Yes ☐ No
Splash Shield....................☐ Yes ☐ No
Splash suits/coveralls ....☐ Yes ☐ No
Steel toe/shank ....☐ Yes ☐ No
Workboots.........................☐ Yes ☐ No

Hearing Protection ☐ Yes ☐ No
Safety belt/harness ☐ Yes ☐ No
Radio ☐ Yes ☐ No
Barricades ☐ Yes ☐ No
Gloves (Type) ☐ Yes ☐ No
Work/rest regimen ☐ Yes ☐ No

Modifications/Exceptions: ______________________

VII. Procedure review with permit acceptors

	Yes	NA
Safety shower/eyewash (Location & Use)....	☐	☐
Procedure for safe job completion................	☐	☐
Contractor tools/equipment inspected..........	☐	☐
Emergency alarms...............	☐	☐
Evacuation routes	☐	☐
Assembly points...................	☐	☐

VIII. Equipment Preparation

	Yes	NA
Equipment drained/depressured	☐	☐
Equipment purged/cleaned..............................	☐	☐
Isolation checklist completed..............................	☐	☐
Electrical lockout required/field switch tested	☐	☐
Blinds/misalignments/blocks & bleeds in place	☐	☐
Hazardous materials on walls/behind liners considered..............................	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.)......... ☐ Yes ☐ No
If yes, contact Health Science, Pittsburgh, PA Office

X. Special instructions, precautions: ______________________

Permit Issued by: ______________________ Permit Accepted by: ______________________
Job Completed by: ______________________ Date: ______________________

11.0 CONFINED SPACE ENTRY

It is not anticipated, under the proposed scope of work, that confined space and permit-required confined space activities will be conducted. **Therefore, personnel under the provisions of this HASP are not allowed, under any circumstances, to enter confined spaces.** A confined space is defined as an area which has one or more of the following characteristics:

- Is large enough and so configured that an employee can bodily enter and perform assigned work.
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry).
- Is not designed for continuous employee occupancy.

A Permit-Required Confined Space is one that:

- Contains or has a potential to contain a hazardous atmosphere.
- Contains a material that has the potential to engulf an entrant.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section.
- Contains any other recognized, serious, safety or health hazard.

For further information on confined space, consult the Health and Safety Guidance Manual or call the PHSO. If confined space operations are to be performed as part of the scope of work, detailed procedures and training requirements will have to be addressed.

12.0 MATERIALS AND DOCUMENTATION

The TtNUS FOL shall ensure the following materials/documents are taken to the project site and used when required.

- A complete copy of this HASP
- Health and Safety Guidance Manual
- Incident Reports
- Medical Data Sheets
- Material Safety Data Sheets for all chemicals brought on site, including decon solutions, fuels, lime, sample preservatives, calibration gases, etc.
- A full-size OSHA Job Safety and Health Poster (posted in the site trailers)
- Training/Medical Surveillance Documentation Form (Blank)
- Emergency Reference Information (Section 2.0, extra copy for posting)

12.1 MATERIALS TO BE POSTED AT THE SITE

The following documentation is to be posted at the site for quick reference purposes. In situations where posting of these documents is not feasible (such as no office trailer), these documents should be filed in a transportable file container and immediately accessible. The file should remain in the FOL's possession.

Chemical Inventory Listing - This list represents all chemicals brought on site, including decontamination solutions, sample preservatives, fuel, calibration gases, etc.. This list should be posted in a central area.

Material Safety Data Sheets (MSDSs) - The MSDSs should also be in a central area accessible to all site personnel. These documents should match all the listings on the chemical inventory list for all substances employed on site. It is acceptable to have these documents within a central folder and the chemical inventory as the table of contents.

The OSHA Job Safety & Health Protection Poster - This poster, as directed by 29 CFR 1903.2 (a)(1), should be conspicuously posted in places where notices to employees are normally posted. Each FOL shall ensure that this poster is not defaced, altered, or covered by other material.

Site Clearance Posting - This list is found within the training section of the HASP (See Figure 8-1). This list identifies all site personnel, dates of training (including site-specific training), and medical surveillance and indicates not only clearance but also status. If personnel do not meet these requirements, they do not enter the site while site personnel are engaged in activities.

Emergency Phone Numbers and Directions to the Hospital(s) - This list of emergency numbers and hospital directions will be maintained at all phone communications points and in each site vehicle.

Medical Data Sheets/Cards - Medical Data Sheets will be filled out by all onsite personnel and filed in a central location. The Medical Data Sheet will accompany any injury or illness requiring medical attention to the medical facility. A copy of this sheet or a wallet card will be given to all personnel to be carried on their person.

Personnel Monitoring - All results generated through personnel sampling (levels of airborne toxics, noise levels, etc.) will be posted to inform individuals of the results of that effort.

Placards and Labels - Where chemical inventories have been separated, because of quantities and incompatibilities, these areas will be conspicuously marked using Department of Transportation (DOT) placards and acceptable [Hazard Communication 29 CFR 1910.1200 (f)] labels.

13.0 GLOSSARY

ACGIH	American Conference of Governmental Industrial Hygienists
APR	Air Purifying Respirators
AOC	Area of Concern
CFR	Code of Federal Regulations
CNS	Central Nervous System
CRZ	Contamination Reduction Zone
DOD	Department of Defense
DOT	Department of Transportation
EPA	Environmental Protection Agency
eV	electron Volts
FID	Flame Ionization Detector
FOL	Field Operations Leader
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	High Efficiency Particulate Air
LEL/O_2	Lower Explosive Limit/Oxygen
N/A	Not Available
NIOSH	National Institute Occupational Safety and Health
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)
PEL	Permissible Exposure Limit
PHSO	Project Health and Safety Officer
PID	Photo Ionization Detector
PPE	Personal Protective Equipment
PVC	Poly Vinyl Chloride
SAP	Sampling and Analysis Plan
SCBA	Self Contained Breathing Apparatus
SSO	Site Safety Officer
STEL	Short Term Exposure Limit
TOM	Task Order Manager
TPH	Total Petroleum Hydrocarbons
TWA	Time Weighted Average
UV	Ultraviolet
WP	Work Plan

ATTACHMENT I

INJURY/ILLNESS PROCEDURE AND REPORT FORM

CASE NO. ________

TETRA TECH NUS, INC.

INJURY/ILLNESS PROCEDURE
WORKER'S COMPENSATION PROGRAM

WHAT YOU SHOULD DO IF YOU ARE INJURED OR DEVELOP AN ILLNESS AS A RESULT OF YOUR EMPLOYMENT:

- If injury is minor, obtain appropriate first aid treatment.
- If injury or illness is severe or life threatening, obtain professional medical treatment at the nearest hospital emergency room.
- If incident involves a chemical exposure on a project work site, follow instructions in the Health & Safety Plan.
- Immediately report any injury or illness to your supervisor or office manager. In addition, you must contact your Human Resources representative, Marilyn Diethorn at (412) 921-8475, and the Corporate Health and Safety Manager, Matt Soltis at (412) 921-8912 within 24 hours. You will be required to complete an Injury/Illness Report (attached). You may also be required to participate in a more detailed investigation from the Health Sciences Department.
- If further medical treatment is needed, The Hartford Network Referral Unit will furnish a list of network providers customized to the location of the injured employee. These providers are to be used for treatment of Worker's Compensation injuries subject to the laws of the state in which you work. Please call Marilyn Diethorn at (412) 921-8475 for the number of the Referral Unit.

ADDITIONAL QUESTIONS REGARDING WORKER'S COMPENSATION:

Contact your local human resources representative, corporate health and safety coordinator, or Corporate Administration in Pasadena, California, at (626) 351-4664.

Worker's compensation is a state-mandated program that provides medical and disability benefits to employees who become disabled due to job related injury or illness. Tetra Tech, Inc. and its subsidiaries (Tetra Tech or Company) pay premiums on behalf of their employees. The type of injuries or illnesses covered and the amount of benefits paid are regulated by the state worker's compensation boards and vary from state to state. Corporate Administration in Pasadena is responsible for administering the Company's worker's compensation program. The following is a general explanation of worker's compensation provided in the event that you become injured or develop an illness as a result of your employment with Tetra Tech or any of its subsidiaries. Please be aware that the term used for worker's compensation varies from state to state.

WHO IS COVERED:

All employees of Tetra Tech, whether they are on a full-time, part-time or temporary status, working in an office or in the field, are entitled to worker's compensation benefits. All employees must follow the above injury/illness reporting procedures. Consultants, independent contractors, and employees of subcontractors are <u>not</u> covered by Tetra Tech's Worker's Compensation plan.

CASE NO. __________

WHAT IS COVERED:

If you are injured or develop an illness caused by your employment, worker's compensation benefits are available to you subject to the laws of the state you work in. Injuries do not have to be serious; even injuries treated by first aid practices are covered and must be reported. Please note that if you are working out-of-state and away from your home office, you are still eligible for worker's compensation benefits.

CASE NO. ________

TETRA TECH NUS, INC.
INJURY/ILLNESS PROCEDURE
WORKER'S COMPENSATION PROGRAM

To: Corporate Health and Safety Manager
Human Resource Administrator

Prepared by: ________

Position: ________

Office: ________

Telephone: ________

Project Name: ________

Project No. ________

Information Regarding Injured or Ill Employee:

Name: ________

Home address: ________

____

Home telephone: ________

Occupation (regular job title): ________

Department: ________

Office: ________

Gender: M ☐ F ☐ No. of dependents: ________

Marital status: ________

Date of birth: ________

Social Security No.: ________

Date of Accident: ________ **Time of Accident:** ________

Location of Accident Was place of accident or exposure on employer's premises Yes ☐ No ☐

Street address: ________

City, state, and zip code: ________

County: ________

Narrative Description of How Accident Occurred: (Be specific. Explain what the employee was doing and how the accident occurred.)

TETRA TECH, INC.
INJURY/ILLNESS REPORT

Did employee die? Yes ☐ No ☐
Was employee performing regular job duties? Yes ☐ No ☐
Was safety equipment provided? Yes ☐ No ☐
Was safety equipment used? Yes ☐ No ☐
Note: Attach any police reports or related diagrams to this accident report.

Witness(es):
Name:
Address:
Telephone:

Describe the Illness or Injury and Part of Body Affected:

Name the Object or Substance which Directly Injured the Employee:

Medical Treatment Required:
☐ No ☐ Yes ☐ First Aid Only
Physician's Name: ______________________
Address: ______________________
Hospital or Office Name: ______________________
Address: ______________________
____
Telephone No.: ______________________

Lost Work Days:
☐ No. of Lost Work Days ______________________
Last Date Worked ______________________
Time Employee Left Work ______________________
Date Employee Returned to Work ______________________
☐ No. of Restricted Work Days ______________________
☐ None

Corrective Action(s) Taken by Unit Reporting the Accident:

Corrective Action Still to be Taken (by whom and when):

Name of Tetra Tech employee the injury or illness was first reported to: ______________________________

Date of Report: ____________________________ Time of Report: ____________________________

	Printed Name	Signature	Telephone No.	Date
Project or Office Manager				
Site Safety Coordinator				
Injured Employee				

To be completed by Human Resources:

Date of hire: **Hire date in current job:**

Wage information: $ ______________ **per** __________ **(hour, day, week, or month)**

Position at time of hire:

Shift hours:

State in which employee was hired:

Status: ☐ **Full-time** ☐ **Part-time** **Hours per week:** __________ **Days per week:** ________

Temporary job end date:

To be completed during report to workers' compensation insurance carrier:

Date reported: **Reported by:**

TeleClaim phone number:

TeleClaim account number:

Location code:

Confirmation number:

Name of contact:

Field office of claims adjuster:

ATTACHMENT II

TICK CONTROL AND LYME DISEASE

TICK CONTROL
AND
LYME DISEASE

The occurrence of Lyme disease has become a worldwide problem since its identification in 1976. This disease is characteristically recognized as being transmitted by ticks, which may be encountered by field personnel while working at this site. As a result, this discussion has been included with this Health and Safety Plan to provide for adequate recognition, evaluation, and control efforts to minimize the occurrence and effects of this potential hazard.

The discovery of Lyme disease is credited to Dr. Allen Steere of Yale University Medical School, and is named after the community where it was (reportedly) first encountered, Lyme, Connecticut. This disease can be transmitted to man through the bite of ticks that are infected with a cork screw-shaped microbe (spirochete). The spread of this disease has been so rapid that in 1984 it surpassed Rocky Mountain Spotted fever as the most common tick-borne disease in the United States. In this country, most of the incidents of this disease have been recorded in the Northeast, and the tick species most commonly attributed with its spread is the deer tick.

Recognition

This hazard potential exists primarily in the spring and summer months, as these are the seasons that tick populations and activity flourish. In fact, 90 percent of the reported cases have occurred from early June through September. Also, this concern exists primarily in heavily vegetated areas. Therefore, recognition of these factors can aid in the awareness and control of this threat.

To aid in the recognition and identification of these insects, an example illustration of the tick species common to the region where this site is located has been included with this discussion. This species (the American Dog tick) is common in the eastern half of the United States, and typically exists in areas covered with grass or underbrush. These insects will attach themselves to animals (including man) that pass through the area and rub against them. After finding a host, the tick inserts its mouthparts and sucks blood until it is fully engorged. This requires a time period of three to twelve days, then the tick will drop off. In addition to Lyme disease concerns, this tick has also been identified as a transmitter of Rocky Mountain Spotted Fever, and the organisms of tularemia and possibly relapsing fever. The wounds left by tick bites can be painful, and can also have a paralyzing effect commonly referred to as tick paralysis.

The earliest symptom of the onset of this disease is the occurrence of an unusual red skin rash. This is commonly the first indication since it has been evidenced that many persons who have contracted this disease were, in fact, unaware that they had been bitten. This rash can appear at the site of the bite anywhere from several days to a few weeks after the bite. It typically starts as a small red spot, and then expands as the spirochetes expand from the bite location. Rash sizes can vary, but have been most commonly associated in a 2 to 3 inch diameter size range. This rash will fade (with or without treatment) after a few weeks. Close inspection is necessary to detect this symptom as the rashes are easy to miss because they're often very faint. Body sites where rashes frequently occur include the thigh areas, groin, and armpits. Also, it is not uncommon for a rash to develop in more than one place.

Other early symptoms include profound fatigue, a stiff neck, and flu-like symptoms such as headache, chills, fever, and muscle aches. Recognition of the onset of any of these symptoms is important since tick bites do not always produce a rash. If left untreated, the disease will progress to its second stage within weeks or months after the infection. This stage involves affects to the heart and nervous system. A common second stage symptom is a paralysis on one or both sides of the face. Others include severe headache, encephalitis, or meningitis. The third and final stage involves the development of chronic inflammatory arthritis, which can occur up to a year or more after the bite.

Evaluation

Evaluation of this hazard potential principally involves field personnel performing close self-inspections for the presence of ticks each time they leave the site. This should involve careful examination, especially of the individuals' heads. Personnel should be aware that when a tick attaches itself to its host, it inserts its entire head under the surface of the skin.

Control

Control of this threat involves several components. First, field personnel must be aware of the climate and area conditions which are commonly associated with being conducive to tick infestation. Second, when working in or walking through potential infested areas, personnel must ensure that they do not have exposed body parts (i.e. at least long sleeved shirts and long pants, particularly when protective coveralls are not worn). In heavily vegetated areas where infestation is likely, Tyvek coveralls will be required to minimize this hazard potential. Also, several commercial products have been demonstrated as being effective in repelling ticks. Examples include Permanone, Off!, and Cutter. These types of repellents will be used at the direction and discretion of the Tetra Tech NUS Health and Safety Officer, and only in accordance and observation of manufacturer's recommendations. In most instances, however, such repellents are typically applied to the outside surfaces of clothing (and not directly onto the skin), and should be applied also to shoe tops, socks, pants cuffs, and other areas most susceptible to ticks.

Tick Removal

In the event that a tick is discovered to be attached to a member of the field team, timely removal of the insect is critical to reducing the potential for contracting the disease. According to available information and research, there is apparently a grace period of at least a few hours from the time of the bite before the tick transmits the microbe (the spirochetes are not present in the mouth parts of the tick). However, the incident of a tick bite is frequently unnoticed, and the discovery of the tick may not occur until after this suspected grace period has already elapsed. Therefore, timely removal is very important. The preferred method of tick removal is to pull it out using tweezers or small forceps. In this method, the tick should be grasped as close to the mouth as possible, and then pulled steadily upward. Care must be exercised so as not to pull in a jerking motion as this can result in the head becoming detached. After the tick has been removed, disinfect the bite with rubbing alcohol or povidone iodine (Betadine). The tick must not be handled as the microbes can enter the body through any breaks in intact skin. The bite should be checked occasionally for at least a two-week period to see if a rash forms. If it does, medical attention must be promptly sought.

In order to provide for proper and timely response to the occurrence of a tick bite, the SSO will ensure that the site First Aid kit is properly equipped with medical forceps and rubbing alcohol, in addition to the standard kit contents. Also, an adequate supply of commercial insect (tick) repellents will be maintained on-site, and all personnel will be trained in its proper application and will be required to use it, at the direction of FOL.

ATTACHMENT III

EQUIPMENT INSPECTION CHECKLIST

EQUIPMENT INSPECTION

COMPANY:____________________________________ **UNIT NO.**________________
FREQUENCY: Inspect daily, document prior to use and as repairs are needed.

Inspection Date: ____/____/____ Time: _______ Equipment Type:______________________
(e.g., bulldozer)

	Good	Need Repair	N/A
Tires or tracks	❐	❐	❐
Hoses and belts	❐	❐	❐
Cab, mirrors, safety glass	❐	❐	❐
- Turn signals, lights, brake lights, etc. (front/rear) for equipment approved for highway use?	❐	❐	❐
- Is the equipment equipped with audible back-up alarms and back-up lights?	❐	❐	❐
Horn and gauges	❐	❐	❐
Brake condition (dynamic, park, etc.)	❐	❐	❐
Fire extinguisher (Type/Rating -___________)	❐	❐	❐
Fluid Levels:			
- Engine oil	❐	❐	❐
- Transmission fluid	❐	❐	❐
- Brake fluid	❐	❐	❐
- Cooling system fluid	❐	❐	❐
- Windshield wipers	❐	❐	❐
- Hydraulic oil	❐	❐	❐
Oil leak/lube	❐	❐	❐
Coupling devices and connectors	❐	❐	❐
Exhaust system	❐	❐	❐
Blade/boom/ripper condition	❐	❐	❐
Accessways: Frame, hand holds, ladders, walkways (non-slip surfaces), guardrails?	❐	❐	❐
Power cable and/or hoist cable	❐	❐	❐
Steering (standard and emergency)	❐	❐	❐

Safety Guards:	**Yes**	**No**
– Around rotating apparatus (belts, pulleys, sprockets, spindles, drums, flywheels, chains) all points of operations protected from accidental contact?____________________	❐	❐
– Hot pipes and surfaces exposed to accidental contact?____________________	❐	❐
– All emergency shut offs have been identified and communicated to the field crew?__________	❐	❐
– Have emergency shutoffs been field tested? ____________________	❐	❐
– Results?______________________________	❐	❐
– Are any structural members bent, rusted, or otherwise show signs of damage?__________	❐	❐
– Are fueling cans used with this equipment approved type safety cans?__________	❐	❐

- Have the attachments designed for use (as per manufacturer's recommendation) with this equipment been inspected and are considered suitable for use?____________________ ☐ ☐

Portable Power Tools:

- Tools and Equipment in Safe Condition?____________________ ☐ ☐
- Saw blades, grinding wheels free from recognizable defects (grinding wheels have been sounded)? ☐ ☐
- Portable electric tools properly grounded?____________________ ☐ ☐
- Damage to electrical power cords?____________________ ☐ ☐
- Blade guards in place?____________________ ☐ ☐
- Components adjusted as per manufacturers recommendation?____________________ ☐ ☐

Cleanliness:

- Overall condition (is the decontamination performed prior to arrival on-site considered acceptable)?__________
- Where was this equipment used prior to its arrival on site?____________________
- Site Contaminants of concern at the previous site?____________________
- Inside debris (coffee cups, soda cans, tools and equipment) blocking free access to foot controls?__________

Operator Qualifications (as applicable for all heavy equipment):

- Does the operator have proper licensing where applicable, (e.g., CDL)?____________________
- Does the operator, understand the equipments operating instructions?____________________
- Is the operator experienced with this equipment? ____________________
- Does the operator have emotional and/or physical limitations which would prevent him/her from performing this task in a safe manner?____________________
- Is the operator 21 years of age or more?____________________

Identification:

- Is a tagging system available, for positive identification, for tools removed from service?___

Additional Inspection Required Prior to Use On-Site

	Yes	No
– Does equipment emit noise levels above 90 decibels?	☐	☐
– If so, has an 8-hour noise dosimetry test been performed?	☐	☐

- Results of noise dosimetry:____________________
- Defects and repairs needed:____________________
- General Safety Condition: ____________________
- Operator or mechanic signature:____________________

Approved for Use: ☐ Yes ☐ No

____
Site Safety Officer Signature

ATTACHMENT IV

SAFE WORK PERMITS

SAFE WORK PERMIT FOR
MULTI-MEDIA SAMPLING

Permit No. ______________ Date: ____________________ Time: From ____________ to ______________

SECTION I: General Job Scope

I. Work limited to the following (description, area, equipment used): Multi-media sampling including groundwater, surface water, sediment, soils, and soil gas.

II. Required Monitoring Instrument(s): PID or FID

III. Field Crew: ____

IV. On-site Inspection conducted ☐☐ Yes ☐ No Initials of Inspector ____________ TtNUS ____________

SECTION II: General Safety Requirements (To be filled in by permit issuer)

IV. Protective equipment required

Level D ☒ Level B ☐
Level C ☐ Level A ☐
Detailed on Reverse

Respiratory equipment required

Full face APR	☐	Escape Pack	☐
Half face APR	☐	SCBA	☐
SKA-PAC SAR	☐	Bottle Trailer	☐
Skid Rig	☐	None	☒

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety shoes, surgical style gloves, and safety glasses. Hard hats and hearing protection will be worn when working near operating equipment or when required by SSO. Coveralls and snake chaps will be worn near insect/snake areas.

V.

Chemicals of Concern	Action Level(s)	Response Measures
Site contaminants include VOCs SVOCs (PAHs from petroleum compound) & PCBs	Any sustained reading 10 ppm above background in worker breathing zones.	Suspend site activities and report to an unaffected area.

VI. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes ☒ No	Hearing Protection (Plugs/Muffs)	☐ Yes	☒ No
Safety Glasses	☐ Yes ☒ No	Safety belt/harness	☒ Yes	☒ No
Chemical/splash goggles	☐ Yes ☒ No	Radio	☐ Yes	☒ No
Splash Shield	☐ Yes ☒ No	Barricades	☐ Yes	☒ No
Splash suits/coveralls	☐ Yes ☒ No	Gloves (Type - Nitrile)	☒ Yes	☐ No
Steel toe Work shoes or boots	☒ Yes ☐ No	Work/rest regimen	☐ Yes	☒ No

Modifications/Exceptions: Reflective vests for high traffic areas. Tyvek coverall if there is a potential for soiling work cloths. Life vest if working over or near water where drowning is a potential hazard.

VII. Procedure review with permit acceptors

	Yes	NA		Yes	NA
Safety shower/eyewash (Location & Use)	☐	☐	Emergency alarms	☐	☐
Procedure for safe job completion	☐	☐	Evacuation routes	☐	☐
Contractor tools/equipment/PPE inspected	☐	☐	Assembly points	☐	☐

VIII. Equipment Preparation

	Yes	NA
Equipment drained/depressurized	☐	☐
Equipment purged/cleaned	☐	☐
Isolation checklist completed	☐	☐
Electrical lockout required/field switch tested	☐	☐
Blinds/misalignments/blocks & bleeds in place	☐	☐
Hazardous materials on walls/behind liners considered	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.) ☐ Yes ☐ No
If yes, complete permit required or contact Health Sciences, Pittsburgh Office

X. Special instructions, precautions: Avoid areas of known or suspected insect/animal nesting or habitat.

Permit Issued by: ______________________________ Permit Accepted by: ______________________

SAFE WORK PERMIT FOR SOIL BORINGS

Permit No. ______________ Date: __________________ Time: From ____________ to ______________

SECTION I: General Job Scope

I. Work limited to the following (description, area, equipment used): **Soil borings using Direct Push Technology (Geoprobe) and hand-auger techniques. Installation of soil gas monitoring points is included in this task.**

II. Required Monitoring Instruments: FID or PID

III. Field Crew: ________________________________

IV. On-site Inspection conducted ☐☐ Yes ☐ No Initials of Inspector ____________ ____________
TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

IV. Protective equipment required

Level D ☒ Level B ☐
Level C ☐ Level A ☐
Detailed on Reverse

Respiratory equipment required

Full face APR	☐	Escape Pack	☐
Half face APR	☐	SCBA	☐
SKA-PAC SAR	☐	Bottle Trailer	☐
Skid Rig	☐	None	☒

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety shoes, safety glasses, hardhat, hearing protection, and nitrile gloves or leather gloves with surgical-style inner gloves.

V. Chemicals of Concern	Action Level(s)	Response Measures
Potential site contaminants are VOCs, SVOCs (PAHs from petroleum compounds) & PCBs	Any sustained readings 10 ppm above background in worker breathing zones.	Suspend site activities and report to an unaffected area.

VI. Additional Safety Equipment/Procedures

Hard-hat	☒ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☒ Yes ☐ No
Safety Glasses	☒ Yes ☐ No	Safety belt/harness	☐ Yes ☒ No
Chemical/splash goggles	☐ Yes ☒ No	Radio	☐ Yes ☒ No
Splash Shield	☐ Yes ☒ No	Barricades	☐ Yes ☒ No
Splash suits/coveralls	☐ Yes ☒ No	Gloves (Type - Nitrile)	☒ Yes ☐ No
Steel toe Work shoes or boots	☒Yes ☐ No	Work/rest regimen	☐ Yes ☒ No

Modifications/Exceptions: Reflective vests for high traffic areas. Tyvek coverall and impermeable boots if there is a potential for soiling work clothes.

VII. Procedure review with permit acceptors

	Yes	NA		Yes	NA
Safety shower/eyewash (Location & Use)	☐	☐	Emergency alarms	☐	☐
Procedure for safe job completion	☐	☐	Evacuation routes	☐	☐
Contractor tools/equipment/PPE inspected	☐	☐	Assembly points	☐	☐

VIII. Equipment Preparation

	Yes	NA
Equipment drained/depressurized	☐	☐
Equipment purged/cleaned	☐	☐
Isolation checklist completed	☐	☐
Electrical lockout required/field switch tested	☐	☐
Blinds/misalignments/blocks & bleeds in place	☐	☐
Hazardous materials on walls/behind liners considered	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.) ☐ Yes ☐ No
If yes, complete permit required or contact Health Sciences, Pittsburgh Office

X. Special instructions, precautions: Avoid areas of known or suspected insect/animal nesting or habitat.

Permit Issued by: ______________________ Permit Accepted by: ______________________

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN

2.0 PROJECT ORGANIZATION

The project organization for the NAS-MAYPORT sampling program is discussed in Section 7 of the SAP.

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective for this project is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results, which are legally defensible in a court of law. Intended data uses are described in Section 1.3.2 of this QAPP. Specific procedures for sampling, chain-of-custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, audits, preventive maintenance of field and laboratory equipment, and corrective action are described in other sections of this QAPP.

The PARCC parameters (precision, accuracy, representativeness, comparability, and completeness) are qualitative and/or quantitative statements regarding the quality characteristics of the data used to support project objectives and ultimately, environmental decisions. These parameters are discussed in the remainder of this section. Specific routine procedures used to assess the quantitative parameters (precision, accuracy, and completeness) are provided in Section 12.0.

3.1 PRECISION

3.1.1 Definition

Precision is a measure of the amount of variability and bias inherent in a data set. Precision describes the reproducibility of measurements of the same parameter for samples under similar conditions. The equation for determining precision is provided in Section 12.2.

3.1.2 Field Precision Objectives

Field duplicates for aqueous matrix samples will not be required. In lieu of taking duplicate measurements and using independent QC check standards, more frequent continuing calibrations will be performed. Field precision is further discussed in Section 7.5 of TtNUS' CompQAP.

3.1.3 Laboratory Precision Objectives

Laboratory precision QC samples are analyzed at a frequency of 5 percent (i.e., one quality control sample per 20 environmental samples). Laboratory precision is measured via comparison of calculated RPD values and Precision Control Limits specified in the analytical method or by the laboratory's QA/QC Program.

With the exception of low-concentration volatiles analysis, precision for volatile and semivolatile organic analyses will be measured via the RPDs for matrix spike/matrix spike duplicate (MS/MSD) samples. The analytical method for low-concentration volatile analysis does not require a specific QC sample to monitor precision, the calibration requirements of the method (i.e., specific limits of precision for the calibration standards) do ensure that a sufficient level of precision is achieved. (Calibration is further discussed in Section 6.0.) Precision for metals analysis will be measured via RPDs for laboratory duplicates. Table 3-1 presents precision control limits for MS/MSD RPDs for organics. Table 3-2 presents precision control limits for laboratory duplicate RPDs for metals. Precision for the remaining parameters (i.e., natural attenuation and miscellaneous parameters) will typically be measured via the RPD results for laboratory duplicate samples. Internal laboratory control limits for precision, which are typically set at three times the standard deviation of a series of RPDs, will be used for evaluation of precision for these parameters.

3.2 ACCURACY

3.2.1 Definition

Accuracy is the degree of agreement between the observed value and an accepted reference value. The equation for determining accuracy is provided in Section 12.1.

3.2.2 Field Accuracy Objectives

The determination of accuracy in the field is not required. In lieu of taking duplicate measurements and using independent QC check standards, more frequent continuing calibrations will be performed. Field accuracy is further discussed in Section 7.5 of TtNUS' CompQAP.

3.2.3 Laboratory Accuracy Objectives

Accuracy in the laboratory is measured through the comparison of a spiked sample result against a known or calculated value expressed as a percent recovery (%R). Percent recoveries are derived from the analysis of known amounts of compounds spiked into deionized water [i.e., laboratory control sample (LCS) analysis], or into actual samples (i.e., surrogate or MS analysis). LCS analyses measure the accuracy of laboratory operations. Surrogate and MS analyses measure the accuracy of laboratory operations as affected by matrix. LCS and/or MS analyses are performed with a frequency of one per

TABLE 3-1

PRECISION CONTROL LIMITS (RPDs)[1]
MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES
VOLATILE AND SEMIVOLATILE ORGANIC ANALYSIS[2]
NAS-MAYPORT, MAYPORT, FLORIDA

Chemical	Solid Samples	Aqueous Samples
VOLATILE ORGANICS		
1,1-Dichloroethene	22	22
Trichloroethene	24	24
Benzene	21	21
Toluene	21	21
Chlorobenzene	21	21
SEMIVOLATILE ORGANICS		
Phenol	35	42
2-Chlorophenol	50	40
1,4-Dichlorobenzene	27	28
N-Nitroso-di-n-propylamine	38	38
1,2,4-Trichlorobenzene	23	28
4-Chloro-3-methylphenol	33	42
Acenaphthene	19	31
4-Nitrophenol	50	50
2,4-Dinitrotoluene	47	38
Pentachlorophenol	47	50
Pyrene	36	31
PESTICIDES		
gamma-BHC (Lindane)	50	50
Heptachlor	31	31
Aldrin	43	43
Dieldrin	38	38
Endrin	45	45
4,4'-DDT	50	50

1 RPD - Relative Percent Difference as described in Section 12.0.
2 USEPA Methods SW-846 8260B and 8270C.

TABLE 3-2

PRECISION CONTROL LIMITS (RPDs)[1]
LABORATORY DUPLICATE SAMPLES
METALS ANALYSIS[2]
NAS-MAYPORT, MAYPORT, FLORIDA

Chemical	Aqueous Samples	Solid Samples
METALS		
Aluminum	20	35
Antimony	20	35
Arsenic	20	35
Barium	20	35
Beryllium	20	35
Cadmium	20	35
Calcium	20	35
Chromium (total)	20	35
Cobalt	20	35
Copper	20	35
Iron	20	35
Lead	20	35
Magnesium	20	35
Manganese	20	35
Mercury	20	35
Nickel	20	35
Potassium	20	35
Selenium	20	35
Silver	20	35
Sodium	20	35
Thallium	20	35
Tin	20	35
Vanadium	20	35
Zinc	20	35

1 RPD - Relative Percent Difference as described in Section 12.0.
2 USEPA Method SW-846 6010B

twenty associated samples of like matrix. Surrogate spike analysis is performed for all chromatographic organic analyses. Laboratory accuracy is assessed via comparison of calculated %Rs with Accuracy Control Limits specified in the analytical method or by the laboratory's QA/QC Program.

Accuracy for volatile and semivolatile organic analysis will be measured via the %Rs for surrogate spikes and MS/MSDs. Accuracy for metals analysis will be measured via %Rs for MSs and LCSs. Table 3-3 presents control limits for LCS and surrogate spike recoveries for low-concentration volatiles. Tables 3-4 and 3-5 present control limits for matrix and surrogate spike recoveries, respectively, for organics. Tables 3-6 and 3-7 present control limits for MS and LCSs, respectively, for metals. Accuracy for the remaining parameters will typically be measured via %Rs for MSs and/or LCSs. Internal laboratory control limits for accuracy, which are typically set at three times the standard deviation of a series of %R values, will be used for evaluation of accuracy for these parameters.

3.3 COMPLETENESS

Completeness is a measure of the amount of usable, valid analytical data obtained, compared to the amount expected. Completeness is typically expressed as a percentage. The equation for completeness is presented in Section 12.3.

The ideal objective for completeness is 100 percent (i.e., every sample planned to be collected is collected; every sample submitted for analysis yields valid data). However, samples can be rendered unusable during shipping or preparation (e.g., bottles broken or extracts accidentally destroyed), errors can be introduced during analysis (e.g., loss of instrument sensitivity, introduction of ambient laboratory contamination), or strong matrix effects can become apparent (e.g., extremely low matrix spike recovery).

These instances result in data that do not meet QC criteria. Based on these considerations, 95 percent is considered an acceptable target for the data completeness objective. If critical data points are lost, resampling and/or reanalysis might be required.

As further discussed in Section 9.2, one hundred percent of the laboratory data for the NAS-MAYPORT investigation program will be reviewed. Data rejected as a result of the review process will be treated as unusable data.

TABLE 3-3

ACCURACY CONTROL LIMITS (%R)[1]
LABORATORY CONTROL SAMPLE AND SURROGATE SPIKE
VOLATILE ORGANIC ANALYSIS[2]
NAS-MAYPORT, MAYPORT, FLORIDA

Chemical	Aqueous Samples
LABORATORY CONTROL SAMPLE	
Vinyl chloride	60-140
1,2-Dichloroethane	60-140
Carbon tetrachloride	60-140
1,2-Dichloropropane	60-140
Trichloroethene	60-140
1,1,2-Trichloroethane	60-140
Benzene	60-140
cis-1,3-Dichloropropene	60-140
Bromoform	60-140
Tetrachloroethene	60-140
1,2-Dibromoethane	60-140
1,4-Dichlorobenzene	60-140
SURROGATE SPIKE	
Bromoflourobenzene	80-120

1 %R - Percent Recovery as described in Section 12.0.
2 USEPA Method 8260B

TABLE 3-4

ACCURACY CONTROL LIMITS (%R)[1]
MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES
VOLATILE AND SEMIVOLATILE ORGANIC ANALYSIS[2]
NAS-MAYPORT, MAYPORT, FLORIDA

Chemical	Solid Samples	Aqueous Samples
VOLATILE ORGANICS		
1,1-Dichloroethene	59-172	NA
Trichloroethene	62-137	NA
Benzene	66-142	NA
Toluene	59-139	NA
Chlorobenzene	60-133	NA
SEMIVOLATILE ORGANICS		
Phenol	26-90	12-110
2-Chlorophenol	25-102	27-123
1,4-Dichlorobenzene	28-104	36-97
N-Nitroso-di-n-propylamine	41.126	41-116
1,2,4-Trichlorobenzene	38-107	39-98
4-Chloro-3-methylphenol	26-103	23-97
Acenaphthene	31-137	46-118
4-Nitrophenol	11-114	10-80
2,4-Dinitrotoluene	28-89	24-96
Pentachlorophenol	17-109	9-103
Pyrene	35-142	26-127
PESTICIDES		
gamma-BHC (Lindane)	46-127	46-127
Heptachlor	35-130	35-130
Aldrin	34-132	34-132
Dieldrin	31-134	31-134
Endrin	42-139	42-139
4,4'-DDT	23-134	23-134

1 %R - Percent Recovery as described in Section 12.0
2 USEPA Method Sw-846 8260B and 8270C

TABLE 3-5

ACCURACY CONTROL LIMITS (%R)[1]
SURROGATE SPIKES
VOLATILE AND SEMIVOLATILE ORGANIC ANALYSIS[2]
NAS-MAYPORT, MAYPORT, FLORIDA

Chemical	Aqueous Samples	Solid Samples
VOLATILE ORGANICS		
Toluene-d8	NA	84-138
Bromofluorobenzene	NA	59-113
1,2-Dichloroethane-d4	NA	70-121
SEMIVOLATILE ORGANICS		
Nitrobenzene-d5	35-114	23-120
2-Fluorobiphenyl	43-116	30-115
Terphenyl-d14	33-141	18-137
Phenol-d5	10-110	24-113
2-Fluorophenol	21-110	24-121
2,4,6-Tribromophenol	10-123	19-122
2-Chlorophenol-d4	33-110(3)	20-130(3)
1,2-Dichlorobenzene-d4	16-110(3)	20-130(3)
PESTICIDES		
Tetrachloro-m-xylene	60-150	60-150
Decachlorobiphenyl	60-150	60-150

1 %R - Percent Recovery as described in Section 12.0.
2 USEPA Method SW-846 Method 8260B and 8270C
3 Advisory limits only.

TABLE 3-6

ACCURACY CONTROL LIMITS (%R)[1]
MATRIX SPIKE SAMPLES
METALS ANALYSIS[2)]
NAS-MAYPORT, MAYPORT, FLORIDA

Chemical	Aqueous Samples	Solid Samples
METALS		
Aluminum	75-125	NS(3)
Antimony	75-125	75-125
Arsenic	75-125	75-125
Barium	75-125	75-125
Beryllium	75-125	75-125
Cadmium	75-125	75-125
Calcium	NS	NS
Chromium (total)	75-125	75-125
Cobalt	75-125	75-125
Copper	75-125	75-125
Iron	75-125	NS
Lead	75-125	75-125
Magnesium	NS	NS
Manganese	75-125	75-125
Mercury	75-125	75-125
Nickel	75-125	75-125
Potassium	NS	NS
Selenium	75-125	75-125
Silver	75-125	75-125
Sodium	NS	NS
Thallium	75-125	75-125
Tin	75-125	75-125
Vanadium	75-125	75-125
Zinc	75-125	75-125

1 %R - Percent Recovery as described in Section 12.0.
2 USEPA Method 6010B

TABLE 3-7

ACCURACY CONTROL LIMITS (%R)[1]
LABORATORY CONTROL SAMPLES
METALS ANALYSIS[2]
NAS-MAYPORT, MAYPORT, FLORIDA

Chemical	Aqueous Samples	Solid Samples
Aluminum	80-120	TBD
Antimony	80-120(3)	TBD
Arsenic	80-120	TBD
Barium	80-120	TBD
Beryllium	80-120	TBD
Cadmium	80-120	TBD
Calcium	80-120	TBD
Chromium	80-120	TBD
Cobalt	80-120	TBD
Copper	80-120	TBD
Iron	80-120	TBD
Lead	80-120	TBD
Magnesium	80-120	TBD
Manganese	80-120	TBD
Mercury	NA	TBD
Nickel	80-120	TBD
Potassium	80-120	TBD
Selenium	80-120	TBD
Silver	80-120(3)	TBD
Sodium	80-120	TBD
Thallium	80-120	TBD
Tin	80-120	TBD
Vanadium	80-120	TBD
Zinc	80-120	TBD

1 Recovery as described in Section 12.0.
2 USEPA Method 6010B
3 Advisory Limits

3.4 REPRESENTATIVENESS

3.4.1 Definition

Representativeness is an expression of the degree to which the data accurately and precisely depict the actual characteristics of a population or environmental condition existing at an individual sampling point. Use of standardized sampling, handling, analytical, and reporting procedures ensures that the final data accurately represent actual site conditions.

3.4.2 Measures to Ensure Representativeness of Field Data

Representativeness is dependent upon the proper design of the sampling program. It will be satisfied by ensuring that the SAP is followed and that proper sampling techniques are used. The sampling network for the NAS-MAYPORT sampling program was designed to provide data representative of site conditions. During development of this network, consideration was given to past waste disposal practices, existing analytical data, and physical setting and processes. The rationale of the sampling network is discussed in detail in Section 2 of the SAP.

3.4.3 Measures to Ensure Representativeness of Laboratory Data

Representativeness in the laboratory data is ensured by using the proper analytical procedures, meeting sample-holding times, and analyzing and assessing duplicate samples.

3.5 COMPARABILITY

3.5.1 Definition

Comparability is defined as the confidence with which one data set can be compared to another (e.g., between sampling points; between sampling events). Comparability is achieved by using standardized sampling and analysis methods, and data reporting formats (including use of consistent units of measure). Additionally, consideration is given to seasonal conditions and other environmental variations that could influence data results.

3.5.2 Measures to Ensure Comparability of Field Data

Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the SAP is followed and that proper sampling techniques are used. It is also dependent on recording field measurements using the correct units. Field measurement units are further discussed in Section 9.1.1.

3.5.3 Measures to Ensure Comparability of Laboratory Data

Planned analytical data will be comparable when similar sampling and analytical methods are used and documented. Results will be reported in units that ensure comparability with previous data and with current state and Federal standards and guidelines. Laboratory measurement units are further discussed in Section 9.1.2.

3.6 LEVEL OF QUALITY CONTROL EFFORT

Trip blank, rinsate blank, method blank, field and laboratory duplicate, laboratory control, and matrix spike samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs.

External QC measures (i.e., field quality control samples) consist of field duplicates, trip blanks, and equipment rinsate blanks. Information gained from these analyses further characterizes the level of data quality obtained to support project goals. Each of these types of field quality control samples undergo the same preservation, analysis, and reporting procedures as the related environmental samples. Each type of field quality control sample is discussed below.

Field duplicates are either two samples collected independently at a sampling location (e.g., surface water), or a single sample homogenized and split into two portions. [When volatile organic compounds (VOCs) are to be analyzed, the VOC sample aliquots are containerized first to avoid loss of constituents, and then the remaining sample matrix is homogenized.] Field duplicates are collected and analyzed for all chemical constituents to measure the precision of the sampling and analysis methods employed. The level of the QC effort will be one field duplicate for every 5 to 9 samples and then 10% of the number of additional investigative samples.

Trip blanks, consisting of analyze-free water, will be submitted to the laboratory to provide the means to assess the quality of the data resulting from the field-sampling program. Trip blanks only pertain to samples collected for VOC analysis. Trip blanks are used to assess the potential for contamination of samples to be analyzed for VOCs by contaminant migration into sample containers during sample shipment and storage. Trip blanks are prepared by the laboratory prior to the sampling event, shipped to the site with the sample containers, and kept with the investigative samples throughout the sampling event. They are then packaged for shipment with other VOC samples and sent for analysis. There should be one trip blank included in each sample-shipping container that contains samples for VOC analysis. At no time after trip blank preparation are their sample containers to be opened before they reach the laboratory. Trip blanks are further discussed in Section 9.0 of TtNUS' CompQAP.

Equipment rinsate blanks are obtained under representative field conditions by collecting the rinse water generated by running analyte-free water through sample collection equipment after decontamination and prior to use. At least one equipment blank will be collected per day, per matrix. If pre-cleaned, dedicated, or disposable sampling equipment is used, one rinsate blank per type of equipment used must be collected as a "batch blank." Rinsate blanks are analyzed for the same chemical constituents as the associated environmental samples. Equipment blanks are further discussed in Section 9.0 of TtNUS' CompQAP.

Method blank samples are generated within the laboratory and used to assess contamination resulting from laboratory procedures. Laboratory duplicate samples are analyzed for inorganic parameters to check for sampling and analytical reproducibility. MSs provide information about the effect of the sample matrix on the digestion and measurement methodology. All MSs for organic analyses are performed in duplicate and, as previously defined, are referred to as MS/MSD samples.

MS/MSD samples are investigative samples. Aqueous MS/MSD samples must be collected at triple the volume for VOCs and extractable organics. One MS/MSD sample will be collected/designated for every 20 or fewer investigative samples per sample matrix (i.e., groundwater, surface water).

The level of QC effort for analytical testing will conform to the appropriate analytical methods, as specified in Tables 7.1 of this QAPP.

4.0 SAMPLING PROCEDURES

Field sampling procedures for the NAS-MAYPORT sampling program are discussed in TtNUS' CompQAP. In addition, the TtNUS' CompQAP and the SAP addresses the following sampling procedures and field investigation tasks:

- Groundwater-level measurements - Section 4.2.5.4 TtNUS CompQAP
- Monitoring well purging - Section 4.2.5.5 TtNUS CompQAP
- Sample containers, preservatives, and volume requirements – Appendix C
- Field measurements - Section 7.5 TtNUS CompQAP
- Decontamination procedures - Section 4.1 TtNUS CompQAP
- Investigation derived waste - Section 2 SAP
- Sample identification system - Section 3 SAP
- Sample packaging and shipping procedures - Section 4.4.3.2 TtNUS CompQAP
- Field quality control samples - Section 9.1.1 TtNUS CompQAP
- Recordkeeping – TtNUS SOP SA-6.3 (Appendix B)

QUALITY ASSURANCE PROJECT PLAN

RESOURCE CONSERVATION AND RECOVERY ACT
FACILITY ASSESSMENT SAMPLING VISIT
SOLID WASTE MANAGEMENT UNITS 47, 53, AND 55
NAVAL STATION – MAYPORT
MAYPORT, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406

Submitted by:
Tetra Tech NUS, Inc.
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APPENDIX

ACRONYMS/ABBREVIATIONS

ASTM	American Society for Testing and Materials
TtNUS	Tetra Tech NUS, Inc.
BFB	Bromofluorobenzene
CLEAN	Comprehensive Long-Term Environmental Action, Navy
COC	Chain of Custody
CompQAP	Tetra Tech NUS, Inc. FDEP Comprehensive Quality Assurance Plan
CTO	Contract Task Order
CVAA	Cold Vapor Atomic Absorption
DFTPP	Decaflourotriphenyl phosphine
DQO	Data Quality Objective
FDEP	Florida Department of Environmental Protection
FID	Flame Ionization Detector
FOL	Field Operations Leader
FTMR	Field Task Modification Request
GC	Gas Chromatograph
GFAA	Graphite Furnace Atomic Absorption
HASP	Health & Safety Plan
ICP	Inductively Coupled Plasma
LCS	Laboratory Control Sample
MS	Mass Spectrometer
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NFESC	Naval Facilities Engineering Service Center
NIST	National Institute of Science and Technology
NAS – MAYPORT	Naval Station Mayport
PARCC	Precision, Accuracy, Representativeness, Comparability, Completeness
PEM	Performance Evaluation Mixture
PQL	Practical Quantitation Limit
QA	Quality Assurance
QAM	Quality Assurance Manager
QAPP	Quality Assurance Project Plan
QC	Quality Control
RDL	Required Detection Limit
REDOX	Oxidation-Reduction Potential
RQL	Required Quantitation Limit
RPD	Relative Percent Difference
SOP	Standard Operating Procedure
SOW	Statement of Work
TAL	Target Analyte List
TCL	Target Compound List
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
%R	Percent Recovery

1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared by Tetra Tech NUS, Inc (TtNUS) on behalf of the United States Navy Southern Division Naval Facilities Engineering Command and the Naval Station Mayport (NAS-MAYPORT), Mayport, Florida, under the Comprehensive Long-Term Environmental Action Navy (CLEAN III) Contract Number N62467-94-D-0888, Contract Task Order (CTO) 091. The QAPP and other associated documents, including the TtNUS Florida Department of Environmental Protection (FDEP) approved Comprehensive Quality Assurance Plan (CompQAP) No. 980038, dated August 24, 1998, Resource Conservation and Recovery Act (RCRA) Facilities Sampling and Analysis Plan (SAP), prepared by TtNUS, dated March 1999 and the Health and Safety Plan (HASP), constitute the project planning documents for the RCRA Facilities Sampling program to be performed at Solid Waste Management Units (SWMU) SWMU 47, SWMU 53, and SWMU57, located in Mayport, Florida.

This QAPP presents the organization, objectives, planned activities, and specific Quality Assurance/Quality Control (QA/QC) procedures associated with the sampling program. Specific protocols for sampling, sample handling and storage, chain-of-custody, and laboratory and field analyses are described within this document. All QA/QC procedures are structured in accordance with applicable technical standards, the Naval Facilities Engineering Service Center (NFESC) guidance document "Navy Installation Restoration Laboratory Quality Assurance Guide (February 1996), and United States Environmental Protection Agency (USEPA) Region IV and FDEP requirements, regulations, guidance, and technical standards.

1.2 FACILITY DESCRIPTION

A description of SWMUs 47, 53, and 55 at NAS-MAYPORT, including its location, size and borders, site conditions, natural and man-made features, and zones of investigation, is provided in Section 1 of the SAP.

1.3 PROJECT OBJECTIVES

This section discusses the overall project objectives; the anticipated target parameters and intended data uses for both field and laboratory analytical data.

1.3.1 <u>Overall Project Objectives</u>

The overall objectives of the work will be to perform additional sampling of the groundwater, soil, and sediments located at the sites to confirm the presence or absence of suspected contamination. Project objectives are discussed in more detail in Section 2 of the SAP.

1.3.2 <u>Project Target Parameters and Intended Data Uses</u>

This section discusses the field and laboratory analytical information to be generated during the course of the investigation. Field parameters and intended data uses are discussed in Section 1.3.2.1. Laboratory parameters and intended data uses are discussed in Section 1.3.2.2.

1.3.2.1 Field Parameters

Field parameters will include those parameters associated with groundwater, soil and sediment sampling and analysis. All field measurements will be completed using simple field instrumentation or field test kits.

Field parameters including pH, specific conductance, turbidity and temperature will be completed for all groundwater samples. These measurements will be used to support monitoring well purging of stagnant water from well casings. Specific conductance and pH will also be used as general indicators of water quality. Turbidity will be measured using a Turbidity meter. The remaining field parameters will be measured using a meter with a flow-through cell. Further details regarding field-sampling methods are provided in Section 7.5 of TtNUS' CompQAP.

1.3.2.2 Laboratory Parameters

The analytical methods to be used for analysis of the NAS-MAYPORT samples have been selected based on existing analytical data from previous investigations. The suite of analyses for the NAS-MAYPORT investigation includes Target Compound list (TCL) volatiles, TCL semivolatiles, TCL pesticides, and Target Analyte List (TAL) metals. These parameters will be used to evaluate the nature and extent of contamination, and to evaluate contaminant migration pathways and likely source areas to potential receptors. Tables 1-1 through 1-4 provide a summary of all target analytes and associated Required Quantitation Limits (RQL) for volatiles RQL for semivolatiles, RQL for pesticides/PCBs and Required Detection Limits (RDL) for metals. Analytical methods are further discussed in Section 7.0 of this QAPP.

1.4 SAMPLE NETWORK DESIGN AND RATIONALE

The sample network design and rationale is discussed in detail in Section 2 of the SAP. Figures displaying all areas of proposed sampling are provided in Section 2 of the SAP.

1.5 PROJECT SCHEDULE

The project schedule is discussed in Section 7 of the project SAP.

TABLE 1-1

SW-846 8260B ANALYTICAL DETECTION LIMITS
APPENDIX IX AND CLP/TCL LISTS
NAVSTA - MAYPORT
PAGE 1 OF 2

Parameter	RQL[1]		
	Solid Samples	Groundwater Samples	Sediment Samples
Volatile Organic Compounds	**μg/kg**	**μg/L**	**μg/kg**
Acetone	10	5	PQL
Benzene	10	1[2]	PQL
Bromodichloromethane	10	1	PQL
Bromoform	10	1	PQL
Bromomethane	10	1	PQL
2-Butanone	10	5	PQL
Carbon disulfide	10	1	PQL
Carbon tetrachloride	10	1	PQL
Chlorobenzene	10	1	PQL
Chloroethane	10	1	PQL
Chloroform	10	1	PQL
Chloromethane	10	1	PQL
Dibromochloromethane	10	1	PQL
1,2-Dibromo-3-chloropropane	NA	1	PQL
1,2-Dibromoethane	10	1	PQL
1,2-Dichlorobenzene	NA	1	PQL
1,3-Dichlorobenzene	NA	1	PQL
1,4-Dichlorobenzene	NA	1	PQL
1,1-Dichloroethane	10	1	PQL
1,2-Dichloroethane	10	1[2]	PQL
1,1-Dichloroethene	10	1[2]	PQL
cis-1,2-Dichloroethene	NA	1[2]	PQL
trans-1,2-Dichloroethene	NA	1	PQL
1,2-Dichloroethene	10	NA	PQL
1,2-Dichloropropane	10	1	PQL
cis-1,3-Dichloropropene	10	1	PQL
trans-1,3-Dichloropropene	10	1	PQL
Ethylbenzene	10	1	PQL
2-Hexanone	10	5	PQL
4-Methyl-2-pentanone	10	5	PQL
Methylene chloride	10	2	PQL
Styrene	10	1	PQL
1,1,2,2-Tetrachloroethane	10	1	PQL
1,1,1-Trichloroethane	10	1	PQL
1,1,2-Trichloroethane	10	1	PQL
Trichloroethene	10	1[2]	PQL
Tetrachloroethene	10	1	PQL
Toluene	10	1	PQL
Vinyl chloride	10	1[2]	PQL
Xylenes (total)	10	1	PQL

TABLE 1-1

SW-846 8260B ANALYTICAL DETECTION LIMITS
APPENDIX IX AND CLP/TCL LISTS
NAVSTA - MAYPORT
PAGE 2 OF 2

Parameter	RQL[1]		
	Solid Samples	Groundwater Samples	Sediment Samples
Volatile Organic Compounds	**μg/kg**	**μg/L**	**μg/kg**
Trichlorofluoromethane	NA	5	NA
2-chloroethylvinyl ether	NA	**1[2]**	NA
Acrolein	NA	1	NA
Acrylonitrile	NA	1	NA
Acrolein	NA	1	NA
Chloroprene	NA	1	NA
3-Chloroprene	NA	1	NA
Dibromomethane	NA	1	NA
Ethyl Methacrylate	NA	1	NA
Iodomethane	NA	1	NA
Methacrylonitrile	NA	**1[2]**	NA
Methyl methacrylate	NA	**1[2]**	NA
Vinyl acetate	NA	**1[2]**	NA
Trans-1,4-dichloro-2-butene	NA	1	NA
Dichlorodifluoromethane	NA	1	NA
Isobutyl Alcohol	NA	PQL	NA
Propionitrile	NA	PQL	NA
Acetonitrile	NA	PQL	NA
Pentachloroethane	NA	1	NA
1,1,1,2-Tetrachloroethane	NA	1	NA
1,2,3-Trichloropropane	NA	1	NA

PQL Practical Quantitation Limit
1 RQL Required Maximum Quantitation Limit
2 COC Chemicals historically present at the site (Chemical of Concern)
3 Appendix IX 40 Code of Federal Regulations Part 264, Appendix IX Groundwater Monitoring List
4 CLP TCL U.S. Environmental Protection Agency Contract Laboratory Program Target Compound List OLM03.0

TABLE 1-2

SW-846 8270C ANALYTICAL DETECTION LIMITS
APPENDIX IX AND CLP/TCL LISTS
NAVSTA - MAYPORT
PAGE 1 OF 4

Parameter	RQL[1]		
	Solid Samples	Groundwater Samples	Sediment Samples
Semivolatile Organic Compounds	µg/kg	µg/L	µg/kg
Acenaphthene	330	10	PQL
Acenaphthylene	330	10	PQL
Anthracene	330	10	PQL
Benzo(a)anthracene	330	10	PQL
Benzo(a)pyrene	330	10	PQL
Benzo(b)fluoranthene	330	10	PQL
Benzo(g,h,i)perylene	330	10	PQL
Benzo(k)fluoranthene	330	10	PQL
Bis(2-chloroethoxy)methane	330	10	PQL
Bis(2-chloroethyl)ether	330	10	PQL
Bis(2-ethylhexyl)phthalate	330	5[2]	PQL
4-Bromophenyl-phenylether	330	10	PQL
Butylbenzylphthalate	330	10	PQL
Carbazole	330	NA	PQL
4-Chloro-3-methylphenol	330	10	PQL
4-Chloroaniline	330	10	PQL
2-Chloronaphthalene	330	10	PQL
2-Chlorophenol	330	10	PQL
4-Chlorophenyl-phenylether	330	10	PQL
Chrysene	330	10	PQL
Dibenz(a,h)anthracene	330	10	PQL
Dibenzofuran	330	10	PQL
3,3'-Dichlorobenzidine	330	10	PQL
Diethylphthalate	330	10	PQL
Di-n-butylphthalate	330	10	PQL
Di-n-octylphthalate	330	10	PQL
4,6-Dinitro-2-methylphenol	830	25	PQL
2,4-Dinitrophenol	830	25	PQL
2,4-Dinitrotoluene	330	10	PQL
1,2-Dichlorobenzene	330	10	PQL
1,3-Dichlorobenzene	330	10	PQL
1,4-Dichlorobenzene	330	10	PQL
2,4-Dichlorophenol	330	10	PQL
Dimethylphthalate	330	10	PQL
2,4-Dimethylphenol	330	10	PQL
2,6-Dinitrotoluene	330	10	PQL
Fluoranthene	330	10	PQL

TABLE 1-2

ANALYTICAL DETECTION LIMITS – TCL SEMIVOLATILES
APPENDIX IX AND CLP TCL LISTS
NAS-MAYPORT FIELD, MAYPORT, FLORIDA
PAGE 2 OF 4

Parameter	RQL(1)		
	Solid Samples	Groundwater Samples	Sediments Samples
Semivolatile Organic Compounds	µg/kg	µg/L	µg/kg
Fluorene	330	10	PQL
Hexachlorobenzene	330	10	PQL
Hexachlorobutadiene	330	10	PQL
Hexachlorocyclopentadiene	330	10	PQL
Hexachloroethane	330	10	PQL
Indeno(1,2,3-cd)pyrene	330	10	PQL
Isophorone	330	10	PQL
2-Methylnaphthalene	330	10	PQL
2-Methylphenol	330	10	PQL
4-Methylphenol	330	10	PQL
Naphthalene	330	10	PQL
2-Nitroaniline	330	25	PQL
3-Nitroaniline	830	25	PQL
4-Nitroaniline	830	25	PQL
Nitrobenzene	830	10	PQL
2-Nitrophenol	330	10	PQL
4-Nitrophenol	330	25	PQL
N-nitroso-di-n-propylamine	330	10	PQL
N-nitrosodiphenylamine	330	10	PQL
2,2'-Oxybis(1-chloropropane)	330	10	PQL
Pentachlorophenol	830	25	PQL
Phenanthrene	330	10	PQL
Phenol	330	10	PQL
Pyrene	330	10	PQL
1,2,4-Trichlorobenzene	330	10	PQL
2,4,5-Trichlorophenol	830	25	PQL
2,4,6-Trichlorophenol	330	10	PQL
2,3,4,6-Tetrrachlorophenol	NA	10	NA
2,6-Dichlorophenol	NA	10	NA
n-Nitrosodimethylamine	NA	10	NA
2-Picoline	NA	10	NA
Diphenylamine	NA	10	NA
Benzyl alcohol	NA	10	NA
n-Nitrosomethylethylamine	NA	10	NA
p-Phenylenediamine	NA	10	NA
3-and-4-Methylphenol	NA	10	NA

TABLE 1-2

ANALYTICAL DETECTION LIMITS – TCL SEMIVOLATILES
APPENDIX IX AND CLP TCL LISTS
NAS-MAYPORT FIELD, MAYPORT, FLORIDA
PAGE 3 OF 4

Parameter	RQL(1)		
	Solid Samples	Groundwater Samples	Sediment Samples
Semivolatile Organic Compounds	µg/kg	µg/L	µg/kg
Pyridine	NA	10	NA
3,3'-Dimethylbenzidine	NA	10	NA
Isosafrole	NA	10	NA
1,4-Napthoquinone	NA	10	NA
1-Napthylamine	NA	10	NA
Aramite	NA	10	NA
Hexachloropropene	NA	10	NA
Pronamide	NA	10	NA
2-Acetylaminofluorene	NA	10	NA
n-Nitrosodiethylamine	NA	10	NA
3-Methylcholanthrene	NA	10	NA
4-Nitroquinoline-1-oxide	NA	10	NA
7,12-Dimethylbenz(a)axobenzene	NA	10	NA
n-Nitrosomorpholine	NA	10	NA
p-(Dimethylamino)azobenzene	NA	10	NA
Pentachlorobenzene	NA	10	NA
Phenacetin	NA	10	NA
Ethyl methanesulfonate	NA	10	NA
Aniline	NA	10	NA
Methyl methanesulfonate	NA	10	NA
Hexachlorophene	NA	10	NA
Pentachloronitrobenzene	NA	10	NA
2-Naphthylamine	NA	10	NA
Methapyrilene	NA	10	NA
4-Aminobiphenyl	NA	10	NA
n-Nitroso-di-n-butylamine	NA	10	NA
n-Nitrosopyrrolidine	NA	10	NA
o-Toluidine	NA	10	NA
1,2,4,5-Tetrachlorobenzene	NA	10	NA
Acetophenone	NA	10	NA
1,3,5-Trinitrobenzene	NA	10	NA
5-Nitro-o-toluidine	NA	10	NA
1,3-Dinitrobenzene	NA	10	NA
Sulfotepp	NA	10	NA
Thionazin (Zinphos)	NA	10	NA

TABLE 1-2

SW-846 8270C ANALYTICAL DETECTION LIMITS
APPENDIX IX AND CLP/TCL LISTS
NAVSTA - MAYPORT
PAGE 4 OF 4

Parameter	RQL[1]		
	Solid Samples	Groundwater Samples	Sediment Samples
Semivolatile Organic Compounds	µg/kg	µg/L	µg/kg
1,4-Dioxane	NA	PQL	NA
Safrole	NA	10	NA

PQL Practical Quantitation Limit
1 RQL Required Maximum Quantitation Limit
2 COC Chemicals historically present at the site (Chemical of Concern)
3 Appendix IX 40 Code of Federal regulations Part 264, Appendix IX Groundwater Monitoring List
4 CLP TCL U.S. Environmental Protection Agency Contract Laboratory Program Target Compound List OLM03.0
NA Not Applicable

TABLE 1-3

SW-846 8081A ANALYTICAL DETECTION LIMITS
APPENDIX IX AND CLP TCL/LISTS
NAVSTA - MAYPORT
PAGE 1 OF 1

Parameter	RQL(1)		
	Solid Samples	Groundwater Samples	Sediment Samples
Pesticides	**µg/kg**	**µg/L**	**µg/kg**
Aldrin	1.7	0.05	1.7
alpha-Benzene hexachloride (BHC)	1.7	0.05	1.7
alpha-Chlordane	1.7	0.05*	1.7
beta-BHC	1.7	0.1	1.7
4,4'-DDE	3.3	0.1	3.3
4,4'-DDD	3.3	0.1	3.3
4,4'-DDT	3.3	0.1	3.3
delta-BHC	1.7	0.05	1.7
Dieldrin	3.3	0.1	3.3
Endosulfan I	1.7	0.05*	1.7
Endosulfan II	3.3	0.05*	3.3
Endosulfan sulfate	3.3	0.1*	3.3
Endrin	3.3	0.1*	3.3
Endrin aldehyde	3.3	0.1	3.3
Endrin ketone	3.3	0.1	3.3
gamma-BHC (Lindane)	1.7	0.2	1.7
gamma-Chlordane	1.7	0.05*	1.7
Heptachlor	1.7	0.05*	1.7
Heptachlor epoxide	1.7	0.1*	1.7
Methoxychlor	17	0.4*	17
Toxaphene	170	1.0*	170

PQL Practical Quantitation Limit
1 RQL Required Maximum Quantitation Limit
2 COC Chemicals historically present at the site (Chemical of Concern)
3 Appendix IX 40 Code of Federal regulations Part 264, Appendix IX Groundwater Monitoring List
4 CLP TCL U.S. Environmental Protection Agency Contract Laboratory Program Target Compound List OLM03.0

TABLE 1-3

SW-826 8082 ANALYTICAL DETECTION LIMITS
APPENDIX IX AND CLP/TCL LISTS
NAVSTA - MAYPORT
PAGE 1 OF 1

Parameter	RQL(1)		
	Solid Samples	Groundwater Samples	Sediment Samples
Pesticides	µg/kg	µg/L	µg/kg
Aroclor-1016	33	PQL	33
Aroclor-1221	33	PQL	33
Aroclor-1232	33	PQL	33
Aroclor-1242	33	PQL	33
Aroclor-1248	33	PQL	33
Aroclor-1254	33	PQL	33
Aroclor-1260	33	PQL	33

PQL Practical Quantitation Limit
1 RQL Required Maximum Quantitation Limit
2 COC Chemicals historically present at the site (Chemical of Concern)
3 Appendix IX 40 Code of Federal regulations Part 264, Appendix IX Groundwater Monitoring List
4 CLP TCL U.S. Environmental Protection Agency Contract Laboratory Program Target Compound List OLM03.0

TABLE 1-4

SW-846 6010B, 9010B, 7000A ANALYTICAL DETECTION LIMITS CLP/TAL, CYANIDE, AND TIN LISTS NAVSTA - MAYPORT PAGE 1 OF 1

Parameter	RDL[1]
	Groundwater Samples
Target Analyte List Metals	µg/L
Aluminum	200
Antimony	60
Arsenic	10
Barium	200
Beryllium	5
Cadmium	5
Calcium	5000
Chromium (total)	10
Cobalt	50
Copper	25
Iron	25
Lead	3
Magnesium	5000
Manganese	15
Mercury	0.2
Nickel	40
Potassium	5000
Selenium	5
Silver	10
Sodium	5000
Thallium	10
Tin	10
Vanadium	50
Zinc	20
Cyanide	1.0

PQL Practical Quantitation Limit
1 RQL Required Maximum Quantitation Limit – Detection Limit expressed as Instrument Detection Limit obtained in pure water. Detection Limit for soil adjusted for the amount of sample analyzed and percent moisture.
2 COC Chemicals historically present at the site (Chemical of Concern)
3 CLP TAL U.S. Environmental Protection Agency Contract Laboratory Program Target Analyte List OLM04.1

TABLE 1-5

SW-846 8141A ANALYTICAL DETECTION LIMITS
APPENDIX IX LISTS
NAVSTA – MAYPORT
PAGE 1 OF 1

Parameter	RDL[1] Groundwater
Target Compound List	µg/L
Dimethoate	PQL
Disulfoton	PQL
Famphur	PQL
Parathion, methyl	PQL
Phorate	PQL

PQL Practical Quantitation Limit
1 RQL Required Maximum Quantitation Limit
2 COC Chemicals historically present at the site (Chemical of Concern)
3 Appendix IX 40 Code of Federal Regulatioins Part 264, Appenmdix IX Groundwater Monitoring List

NA Not Applicable

TABLE 1-6

SW-846 8151A ANALYTICAL DETECTION LIMITS
APPENDIX IX LISTS
NAVSTA – MAYPORT
PAGE 1 OF 1

Parameter	RDL[1]
	Groundwater Samples
Target Compound List	µg/L
2,4-Dichlorophenoxyacid[2,4-D]	PQL
Dinoseb	PQL
-[2,4,5-Trichlorophenoxyl] propionic acid[2,4,5-TP][Silvex]	PQL
2,4,5-T	PQL

PQL Practical Quantitation Limit
1 RQL Required Maximum Quantitation Limit
2 COC Chemicals historically present at the site (Chemical of Concern)
3 Appendix IX 40 Code of Federal Regulatioins Part 264, Appenmdix IX Groundwater Monitoring List

NA Not Applicable

TABLE 1-8

SW-846 3810 and 9056 ANALYTICAL DETECTION LIMITS
APPENDIX IX LISTS
NAVSTA – MAYPORT
PAGE 1 OF 1

Parameter	RDL[1]
	Groundwater Samples
Target Compound List	μg/L
Sulfate	PQL
Methane	PQL

PQL Practical Quantitation Limit
1 RQL Required Maximum Quantitation Limit
2 COC Chemicals historically present at the site (Chemical of Concern)
3 Appendix IX 40 Code of Federal Regulatioins Part 264, Appenmdix IX Groundwater Monitoring List

NA Not Applicable

5.0 CUSTODY PROCEDURES

Custody is one of several factors, which is necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files. Final evidence files, including all originals of laboratory reports and purge files, are maintained under document control in a secure area. A sample or evidence file is under custody if:

- the item is in the actual physical possession of an authorized person, or;
- the item is in view of the person after being in his or her possession, or;
- the item was placed in a secure area to prevent tampering; or
- the item is in a designated and identified secure area with access restricted to authorized personnel only.

The chain-of-custody (COC) report is a multi-part, standardized form used to summarize and document pertinent sample information, such as sample identification and type, matrix, date and time of collection, preservation, and requested analyses. Furthermore, through the sequential signatures of various sample custodians (e.g., sampler, airbill number, laboratory sample custodian), the COC report documents sample custody and tracking. A "Cradle-to-Grave" sample tracking will be employed. Custody procedures apply to all environmental and associated field quality control samples obtained as part of the data collection system.

5.1 FIELD CUSTODY PROCEDURES

The FOL (or designee) is responsible for the care and custody of the samples collected until they are relinquished to the analyzing laboratory or entrusted to a commercial overnight courier. COC reports are completed for each sample shipment. The reports are filled out in a legible manner, using waterproof ink, and are signed (and dated) by the sampler. Pertinent notes, such as whether the sample was field filtered, or whether the sample is suspected to be high in contaminant concentration, are also indicated on the COC report. Information similar to that contained in the COC report is also provided on the sample label, which is securely attached to the sample bottle. COC report forms and sample labels will be supplied by the laboratory subcontractor. In accordance with NFESC guidelines, samples for chemical constituent analysis must be sent (for next-day receipt) to the laboratory within 24-hours of collection.

Full details regarding sample COCs (including use of custody seals and sample shipment protocols) are contained in TtNUS Standard Operating Procedure (SOP) SA-6.1, which is provided as Appendix A. TtNUS SOP SA-6.3, also provided as Appendix B, discusses maintenance of site logbooks, site notebooks, and other field records. Additionally, each of the various sampling SOPs incorporated into this QAPP contains a section that addresses relevant sample documentation (i.e., completion of sample logsheets, etc.). All sample records are eventually docketed into the TtNUS project central file.

5.2 LABORATORY CUSTODY PROCEDURES

When samples are received by the laboratory subcontractor, the laboratory's sample custodian examines each cooler's custody seals to verify that they are intact and that the integrity of the environmental samples has been maintained. The sample custodian then signs the COC report. The custodian then opens the cooler and measures its internal temperature. The temperature reading is noted on the accompanying COC report. The sample custodian then examines the contents of the cooler. Sample container breakages or discrepancies between the COC report and sample label documentation is recorded. With the exception of samples for volatile analysis, the pH of chemically preserved samples is checked using Hydrion paper and recorded. All problems or discrepancies noted during this process are to be promptly reported to the TtNUS Project Manager. Inter-laboratory COC procedures and specific procedures for sample handling, storage, disbursement for analysis, and remnant disposal will be followed as specified by the subcontract laboratory's SOPs and/or QA Plan.

5.3 FINAL EVIDENCE FILES

The TtNUS central file will be the repository for all documents, which constitute evidence relevant to sampling and analysis activities as described in this QAPP. TtNUS is the custodian of the evidence file and maintains the contents of these files, including all relevant records, reports, logs, field notebooks, photographs, subcontractor reports and data reviews in a secure, limited access location and under custody of the TtNUS facility manager. The control file will include at a minimum:

- field logbooks
- field data and data deliverables
- photographs
- drawings
- soil boring logs
- laboratory data deliverables
- data validation reports
- data assessment reports

- progress reports, QA reports, interim project reports, etc.
- all custody documentation (chain-of-custody forms, airbills, etc.)

Upon completion of the contract, all pertinent files will be relinquished to the custody of the United States Navy.

6.0 CALIBRATION PROCEDURES AND FREQUENCY

All instrumentation used to perform chemical measurements must be properly calibrated prior to use in order to obtain valid and usable results. The requirement to properly calibrate instruments prior to use applies equally to field instruments as it does to fixed laboratory instruments. Field instrument calibration is discussed in Section 6.1. Laboratory instrument calibration is discussed in Section 6.2.

6.1 FIELD INSTRUMENT CALIBRATION

Field instrument calibration is discussed in Section 7.5 of TtNUS CompQAP.

6.2 LABORATORY INSTRUMENT CALIBRATION

Calibration procedures for a specific laboratory instrument will consist of initial calibration (generally 3 to 5 points), initial calibration verification (inorganic methods only), and continuing calibration verification. In all cases, the initial calibration will be verified using an independently prepared calibration verification solution. The frequency of calibration will be performed according to the requirements of the specific methods.

All standards used to calibrate analytical instruments must be obtained from the National Institute of Standards and Technology (NIST) or through a reliable commercial supplier with a proven record for quality standards. All commercially supplied standards must be traceable to NIST reference standards, where possible, and appropriate documentation will be obtained from the supplier. In cases where documentation is not available, the laboratory will analyze the standard and compare the results to an USEPA-supplied known or previous NIST-traceable standard.

The calibration procedures and frequencies used by the subcontract laboratory will comply with the applicable analytical method. Brief descriptions of calibration procedures for major instrument types follow.

6.2.1 <u>GC/MS Volatile Organic Compound Analyses</u>

For volatile organic compounds, the gas chromatograph/mass spectrometer (GC/MS) system will be tuned and calibrated in accordance with the appropriate analytical. A bromofluorobenzene (BFB) instrument performance check (tuning check) must be run prior to the initial and each continuing calibration and must meet all method-specified criteria before analysis may continue. Initial calibration is required before any samples are analyzed and must include a blank and a minimum of five different concentrations as specified in the method. A BFB tuning check and a continuing calibration check, including the mid-range standard and a blank, must be performed at the beginning of each 12-hour shift during which analyses are performed.

6.2.2 GC/MS Semivolatile Organic Compound Analyses

For semivolatile organic compounds, the GC/MS system will be tuned and calibrated in accordance with the appropriate analytical method. A decafluorotriphenyl phosphine (DFTPP) instrument performance check (tuning check) must be run prior to the initial and each continuing calibration and must meet all method-specified criteria before analysis may continue. Initial calibration is required before any samples are analyzed and must include a blank plus five different concentrations as specified in the method. A DFTPP tuning check and a continuing calibration check, including the mid-range standard and a blank, must be performed at the beginning of each 12-hour shift during which analyses are performed.

6.2.3 Metals Analyses

6.2.3.1 Inductively Coupled Argon Plasma (ICP) Analyses

Inductively coupled plasma (ICP) spectrometry systems will be calibrated for the analysis of metals in accordance with the appropriate analytical method. Initial calibration is required each day before any samples are analyzed and consists of a calibration blank and at least one standard. The standard must be within the demonstrated linear range of the instrument. The linear range is verified quarterly. Following initial calibration, an initial calibration verification sample (obtained from a different source than the solutions used for calibration), an initial calibration blank, and an interference check sample are analyzed. A continuing calibration verification sample and a continuing calibration blank are run every 2 hours or every 10 samples, whichever occurs first. A continuing calibration verification sample, a continuing calibration blank, and an interference check sample are also run after analysis of the last sample. The initial calibration verification standard, continuing calibration verification standard, and interference check sample each contain analytes of interest at different concentrations. In addition, a standard prepared at a concentration of two times the quantitation limit is analyzed at the beginning and end of each sample analysis run or a minimum of twice per 8-hour period. Linearity spanning the range of analysis is verified using this combination of standards. All calibration standards contain acids at the same concentrations as the sample digestates.

6.2.3.2 Atomic Absorption Analyses

Graphite furnace and cold vapor atomic absorption (GFAA and CVAA) analyses will be calibrated in accordance with the appropriate analytical method. Initial calibration is required each day before any samples are analyzed and consists of a calibration blank and at least three calibration standards (at least four standards for mercury) covering the range of concentrations of interest. The correlation coefficient of the regression of concentration versus response should be 0.995 or greater. Immediately following initial calibration, an initial calibration verification sample (obtained from a different source than the solutions used for calibration) and an initial calibration blank are analyzed. A continuing calibration verification sample and a continuing calibration blank are run every two hours or every ten samples, whichever occurs first. A continuing calibration verification sample and a continuing calibration blank are also run after analysis of the last sample.

6.2.4 Miscellaneous Parameters

Calibration and standardization requirements for the analysis of the remaining parameters will be performed as specified in the applicable analytical methods. Analytical methods are further discussed in Section 7.0 of this QAPP.

7.0 ANALYTICAL AND MEASUREMENT PROCEDURES

Samples will be subjected to field and laboratory parameter measurement as necessary based on the sample location under investigation. The analytical program for environmental samples collected at each anticipated location is provided in Section 2 of the SAP.

Chemical/physical parameters to be measured using field instrumentation include; temperature, specific conductance, pH, and turbidity. Measurement of field parameters and calibration of field instruments are discussed in Section 7.5 of TtNUS' CompQAP.

The analytical laboratory responsible for the chemical analyses must NFESC-approved, will be certified by the Florida Department of Health – Division of Laboratory Certification for all analyses that are requested by TtNUS and will be required to have a current FDEP approved CompQAP.

All groundwater samples for low-concentration volatiles analysis will be analyzed in accordance with current SW-846 methods. All samples for organics and metals and Inorganics Analysis will be analyzed in accordance with current SW-846 methods. Table 7-1 provides a summary of the laboratory analytical methods for the NAS – MAYPORT sampling program.

A complete list of the target compounds/analytes, RQLs, RDLs, and estimated PQLs is provided in Section 1.3.2.2 of this QAPP. Data generated through use of the EPA method protocols will be reported to the RQL for organics analysis and the RDL for inorganics analysis. Analytes which are positively identified and which can be quantitated at concentrations below the RQL/RDL will be reported as specified in the appropriate analytical method. All environmental data generated through use of non-CLP methods will be reported to the analyte's PQL. An analyte's PQL is an expression of the method detection limit with consideration given to required adjustments to ensure that the precision and accuracy requirements of the method are attainable. The PQLs provided in the tables in Section 1.3.2.2 are estimated since these values may vary based on the laboratory.

Quantitation and detection limits will also be adjusted, as necessary, based on dilutions and sample volume.

TABLE 7-1

SUMMARY OF ORGANIC AND INORGANIC ANALYTICAL PROCEDURES
APPENDIX IX AND CLP TCL LISTS
NAS – MAYPORT, MAYPORT, FLORIDA

Analytical Parameter	Analytical Method
TCL Volatile Organics	SW-846 8240
TCL Semivolatile Organics	SW-846 8270
TCL Pesticides/PCBs	SW-846 8080
TAL Metals/Cyanide	SW-846 6010B/7000A/335.1

8.0 INTERNAL QUALITY CONTROL CHECKS

Field-related QC checks were discussed in Section 3.0 of this QAPP and in Section 9.1.1 of TtNUS' CompQAP. This section provides additional information regarding internal quality control checks for the field and the laboratory.

8.1 FIELD QUALITY CONTROL CHECKS

QC procedures for field measurements will include calibrating the instruments as discussed in Section 7.5 of TtNUS' CompQAP. Assessment of field sampling precision and bias will be made by collection of field duplicates and rinsate blanks for laboratory analysis as discussed in Section 3.6 of this QAPP.

8.2 LABORATORY QUALITY CONTROL CHECKS

The subcontract laboratory will have a QC program that ensures the reliability and validity of the analyses performed at the laboratory. Internal quality control procedures for analyses will comply with the applicable analytical method requirements.

Several internal laboratory QC checks are briefly discussed in the remainder of this section.

Laboratory method blanks are prepared and analyzed in accordance with the analytical method employed to determine whether contaminants originating from laboratory sources have been introduced and have affected environmental sample analyses. A method blank generally consists of an aliquot of analyte-free water that is subjected to the same preparation and analysis procedures as the environmental samples undergoing analysis. With the exception of recognized volatile and semivolatile common laboratory contaminants (i.e., methylene chloride, acetone, 2-butanone, and phthalate esters) detected , method blanks must not contain levels of target analytes above the reported detection limits (above 2.5X the RQL for methylene chloride and above 5X the RQL for acetone, 2-butanone, and phthalate esters). Under no circumstances are laboratory method blank contaminant values subtracted from environmental sample analysis results.

Matrix spike analysis for organic fraction analyses is performed in duplicate as a measure of laboratory precision. For inorganic analyses, one matrix spike analysis and one **laboratory duplicate** analysis are performed for every 20 environmental sample analyses of like matrix. With the exception of VOC MSD analyses, laboratory duplicates are prepared by thoroughly mixing and splitting a sample aliquot into two portions and analyzing each portion following the same analytical procedures that are used for the environmental sample analyses. For VOC MSD analyses, a second sample aliquot is used for analysis in order to avoid VOC constituent loss through the homogenization process. The field crew provides extra volumes of sample matrices designated for laboratory quality control analyses, as required. As discussed in Section 3.0 of this QAPP, control limits for MS and laboratory duplicate analyses.

Surrogates are organic compounds (typically brominated, fluorinated, or isotopically labeled) which are similar in nature to the compounds of concern, and which are not likely to be present in environmental media. Surrogates are spiked into each sample, standard, and method blank prior to analysis, and are used only in organic chromatographic analysis procedures as a check of method effectiveness. As discussed in Section 3.0, surrogate recoveries are evaluated against control limits specified in the associated method, where applicable, or laboratory-derived control limits.

Laboratory control samples serve to monitor the overall performance of each step during the analysis, including the sample preparation. Laboratory control sample analysis will be performed for low-concentration volatiles, metals, and as required by the applicable analytical. Aqueous LCS results must fall within the control limits specified in the analytical method, where applicable, or established by the laboratory. Aqueous LCSs shall be analyzed utilizing the same sample preparations, analytical methods, and QA/QC procedures as employed for the samples.

Internal standard performance criteria ensure that volatile and semivolatile GC/MS analysis sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (- 50% to + 100%) from the associated 12-hour calibration standard (±40% for low-concentration volatile analysis). The retention time of the internal standards in samples and blanks must not vary by more than ±30 seconds from the retention time of the associated 12-hour calibration standard (±20 seconds for low-concentration volatile analysis).

9.0 DATA REDUCTION, VALIDATION, AND REPORTING

This section describes the procedures to be used for data reduction, review, and reporting for NAS – MAYPORT sampling program. All data generated during the course of the investigation will be maintained in hardcopy format by TtNUS in the Naval Facilities Engineering Command Southern Division designated central files located in TtNUS' Pittsburgh office.

In addition to the central files, photocopies of all hardcopy data (as well as electronic data) will be maintained in the Chemistry/Toxicology/Risk Assessment Department database records files located in TtNUS' Pittsburgh, Pennsylvania office. Upon completion of the contract, all files will be relinquished to the Navy.

9.1 DATA REDUCTION

Data reduction will be completed for both field measurements and laboratory-generated analytical data. Field data reduction will be relatively limited versus the degree of laboratory data reduction required for the project. Reduction of both field data and laboratory data are discussed in the remainder of this section.

9.1.1 Field Data Reduction

Field data will be generated through on-site water quality testing for general indicator parameters including pH, specific conductance, turbidity, and temperature.

The field parameters will be recorded in the site logbook and on sample logsheets immediately after the measurements are taken and later encoded in the NAS – MAYPORT database for presentation in the Report. If an error is made in the logbook, the error will be legibly crossed out (single-line strikeout), initialed and dated by the field member, and corrected in a space adjacent to the original (erroneous) entry. No calculations will be necessary to reduce these data for inclusion in Report. Field data will be entered in the electronic database manually, and the entries will be verified by an independent reviewer to make sure that no "transcription" errors occurred.

Field measurements will be recorded and reported in the following units:

- Hydronium ion concentration (standard pH units)
- Temperature (degrees Celsius)
- Specific Conductance (millimhos)
- Turbidity (Nephelometric turbidity units)
- Dissolved oxygen (mg/L)
- Ferrous iron (mg/L)
- REDOX Potential (mV)

Standard pH units as specified above are the negative logarithm (base 10) of the hydronium ion concentration in moles/liter.

9.1.2 Laboratory Data Reduction

Laboratory data reduction of analytical results generated via non-CLP methods will be completed in accordance with the applicable analytical methods.

Laboratory analytical data will be reported using standard concentration units to ensure comparability with regulatory standards/guidelines and previous analytical results. Reporting units for aqueous matrices for the classes of chemicals under consideration are as follows:

Groundwater samples:

- Volatile and semivolatile organics - μg/L
- Metals - μg/L
- Cyanide - mg/L

Soil/Sediment samples:

- Volatile and semivolatile organics - μg/kg
- Metals - μg/kg
- Cyanide - mg/kg

Field Quality Control sample results will be included in the database for the NAS – MAYPORT sampling program. Specifically, the analytical results for field duplicates, trip blanks, and rinsate blanks will be provided. The results for field QC samples will be considered during the course of data review (in concert with laboratory method blanks) to eliminate false positive results according to the 5- and 10-times rules specified in the National Functional Guidelines for Organic and Inorganic Data Review. The results for laboratory QC samples such as method blanks will not be presented in the Report database. In addition, only the original (unspiked) sample results for MS/MSD samples will be provided in the database.

9.2 DATA VALIDATION

Validation of field measurements and laboratory analytical data are discussed in this section. Validation of field data will be limited to real time "reality" checks whereas laboratory analytical data will be reviewed. Review of laboratory analytical data is discussed in Section 9.2.2.

9.2.1 Field Measurement Data Validation

Field measurements will not be subjected to a formal data validation process. However, field technicians will ensure that the equipment used for field measurement is performing accurately via calibration as discussed in Section 7.5 of TtNUS' CompQAP. As described in Section 9.1.1, all field data entered into the electronic database will be independently reviewed for transcription errors.

9.2.2 Laboratory Data Review

One hundred percent of the laboratory data will be reviewed. Review of analytical data will be completed by the TtNUS Chemistry Department located in TtNUS' Pittsburgh, Pennsylvania office. Final review and approval of reviewed deliverables will be completed by the Department's Data Validation Coordinator.

Organic data analytical results will be reviewed versus the applicable analytical method. Particular emphasis will be placed on holding time compliance, spike recoveries, and blank results. The inorganic data analytical results for non-CLP parameters will be reviewed versus the applicable analytical methods.

9.3 DATA REPORTING

9.3.1 Field Measurement Data Reporting

Field data will be reported in the units discussed in Section 9.1.1. The Report will include a comprehensive database including all field measurements (specifically pH, specific conductance, temperature, and turbidity). Field measurements will be transferred from the site logbook or sample logsheets to the electronic database manually and will be reviewed for accuracy by an independent reviewer. Transcription of field measurements to the electronic database will be completed shortly after completion of the field investigation and prior to receipt of laboratory analytical data.

All records regarding field measurements (i.e., field logbooks, sampling logbooks, and sample logsheets) will be placed in TtNUS' Southern Division central files upon completion of the field effort. Entry of these results in the database will require removal of these results from the files. Outcards will be used to document the removal of any such documentation from the files (date, person, subject matter). Field measurement data will be reported in an appendix of the Report at a minimum and may also be reported in summary fashion if they are indicative of the presence of contamination (e.g., high specific conductance readings).

9.3.2 Laboratory Data Reporting

Data reported by the laboratory will be in accordance with the reporting format described in TtNUS' analytical Statement of Work for the contracted laboratory. All pertinent quality control data including method blanks, standards analysis, calibration information, etc. will be provided for the non-CLP analyses. Case narratives and a certificate of analysis will be provided for each Sample Delivery Group.

All environmental and field QC sample results (trip blanks, field duplicates, rinsate blanks) will be included in the Report as an appendix. The database will include pertinent sampling information such as sample number, sampling date, general location, depth, and survey coordinates (if applicable). Sample-specific detection limits will be reported for nondetected analytes. Units will be clearly summarized in the database and will conform to those identified in Section 9.1.2. The analytical data may also be reported in summary fashion within the body of the Report text in tabular and graphic fashion.

Data will be handled electronically pursuant to the electronic deliverable requirements specified in TtNUS' Basic Ordering Agreement with analytical laboratories. This agreement requires the analytical laboratories to provide data in both hardcopy and electronic form. The original electronic diskettes and the original hardcopy analytical data are maintained in TtNUS' Southern Division central files as received.

Data review will be completed using the hard copy data. Upon completion of the review of a Sample Delivery Group and review by the Data Validation Coordinator, review qualifiers will be entered in the electronic database and will be subjected to independent review for accuracy. During this review process, the electronic data base printout will also be contrasted with the hard copy data to ensure that the hard copy data and electronic data are consistent.

In addition, a summary of the data qualifiers for all project samples will be prepared. This summary will include a list of chemicals identified as laboratory and/or field QC blank contaminants, holding time exceedences, samples exhibiting field duplicate/replicate imprecision as well as affected chemicals, rejected results and associated specific causes, and general causes of estimated results. This summary will facilitate the preparation of a summary of the data review results and completeness assessment for inclusion in the Report.

10.0 PERFORMANCE AND SYSTEM AUDITS

Performance and system audits will be performed periodically to ensure that work is being implemented in accordance with the approved Project Plans and in an overall satisfactory manner. Such audits will be performed by various personnel and will include evaluation of field, laboratory, data review, and data reporting processes. Examples of pertinent audits are as follows:

- The FOL will supervise and check daily that the field measurements are made accurately, equipment is thoroughly decontaminated, samples are collected and handled properly, and fieldwork is documented accurately and neatly.

- Performance and system audits of the laboratory will be performed regularly by a Navy Contractor (internal), and in accordance with the Laboratory Quality Assurance Plan (internal).

- Data reviewers will evaluate (on a timely basis) the chemical analytical data packages submitted by the laboratory. The data reviewers will check that the data were obtained through use of an approved methodology, that the appropriate level of QC effort and reporting was conducted, and whether or not the results are in conformance with QC criteria. Based on these factors, the data reviewer will generate a report describing data limitations, which will be reviewed internally by the Data Validation Coordinator prior to submittal to the Project Manager.

- A formal audit of the field sampling procedures may be conducted by the TtNUS Quality Assurance Manager (QAM) or designee in addition to the auditing that is an inherent part of the daily project activities. The purpose of this audit is to ensure that sample collection, handling, and shipping protocols, as well as equipment decontamination and field documentation procedures, are being performed in accordance with the approved Project Plans and SOPs.

- A sample tracking system will be employed for all environmental samples. This system will allow for early detection of errors made in the field or by the laboratory so that necessary adjustments can be made while the field crew is mobilized.

- The Project Manager will maintain contact with the FOL and Data Validation Coordinator to ensure that management of the acquired data proceeds in an organized and expeditious manner. Similarly, the Project Manager will interface with the Modeling Coordinators, as applicable.

11.0 PREVENTIVE MAINTENANCE PROCEDURES

Measuring equipment used in environmental monitoring or analysis for the NAS – MAYPORT sampling program shall be maintained in accordance with the manufacturer's operation and maintenance manuals. Equipment and instruments shall be calibrated in accordance with the procedures, and at the frequency, discussed in Section 6.0 (Calibration Procedures and Frequency). Preventive maintenance for field and laboratory equipment is discussed in the remainder of this section.

11.1 FIELD EQUIPMENT PREVENTIVE MAINTENANCE

TtNUS has established a program for the maintenance of field equipment to ensure the availability of equipment in good working order when and where it is needed. This program consists of the following elements:

- The TtNUS equipment manager keeps an inventory of the equipment in terms of items (model and serial number), quantity, and condition. Each item of equipment is signed out when in use, and its operating condition and cleanliness checked upon return.

- The equipment manager conducts routine checks on the status of equipment and is responsible for the stocking of spare parts and equipment readiness. The equipment manager also maintains the equipment manual library.

- The FOL is responsible for working with the equipment manager to make sure that the equipment is tested, cleaned, charged, and calibrated in accordance with the manufacturer's instructions and TtNUS SOPs before being taken to the job site and during field activities.

- During calibration, an appropriate maintenance check is performed on each piece of equipment. Any problems encountered while operating the instrument will be recorded in the field log book including a description of the symptoms and corrective actions taken.

- If problem equipment is detected or should require service, the equipment should be logged, tagged, and segregated from equipment in proper working order. Use of the instrument will not be resumed until the problem is resolved.

11.2 LABORATORY INSTRUMENT PREVENTIVE MAINTENANCE

Proper maintenance of laboratory instruments and equipment is essential to ensuring their readiness when needed. Dependent on manufacturer's recommendations, maintenance intervals are established for each instrument. All instruments must be labeled with a model number and serial number, and a maintenance logbook must be maintained for each instrument. Personnel must be alert to the maintenance status of the equipment they are using at all times.

11.2.1 Major Instruments

Table 11-1 provides a summary of preventive maintenance procedures typically performed for key analytical instruments. Maintenance of key instruments is sometimes covered under service contracts with external firms. These contracts provide for periodic routine maintenance to help guard against unexpected instrument downtime. The contracts also provide for quick response for unscheduled service calls when malfunctions are observed by the operator.

The use of manufacturer recommended grades or better of supporting supplies and reagents is also a form of preventive maintenance. For example, gases used in the various gas chromatographs and metals instruments should be of sufficient grade to minimize fouling of the instrument. The routine use of septa, chromatographic columns, ferrules, AA furnace tubes, and other supporting supplies from reputable manufacturers will assist in averting unnecessary periods of instrument downtime.

11.2.2 Refrigerators/Ovens

The temperatures of refrigerators used for sample storage and drying ovens will be monitored a minimum of once daily. The acceptable range for refrigerator temperatures is 4°C ±2°C. Required temperatures of ovens will vary based on the analytical methods for which the ovens are used. The temperatures will be recorded on temperature logs. The logs will contain the following information at a minimum:

- Date
- Temperature
- Initials of person performing the check

Maintenance of the logs is typically the responsibility of the sample custodian. However, assignment of responsibilities for temperature monitoring to specific personnel does not preclude the participation of other laboratory personnel. If unusual temperature fluctuations are noted, it is the responsibility of the observer to immediately notify the person in charge of the discrepancy before the condition of the samples is compromised.

Unstable or fluctuating temperatures may be indicative of malfunctions in the cooling or heating system. On the other hand, the instability may be due to frequent opening of the door. Regardless of the cause, such an observation must be investigated, and modifications must be made to access procedures or repairs to equipment must be made to prevent jeopardizing the integrity of the samples.

TABLE 11-1

TYPICAL PREVENTIVE MAINTENANCE FOR KEY ANALYTICAL INSTRUMENTS NAS – WHITING FIELD, MILTON, FLORIDA

Instrument	Preventive Maintenance	Maintenance Frequency
GC/MS	Volatiles: Bake oven, replace septum, check carrier gas. Semivolatiles: Replace the septum, clean injection port, replace liner, bake oven, check carrier gas, clean the source. Replace solvent washes and clean syringe.	As required. As required. Daily.
GC	Replace solvent washes and clean syringe. Clip column, clean injection port, replace liner, and bake oven.	Daily. As required.
ICP	Change sample introduction tubing, clean nebulizer, clean spray chamber, clean torch, manual profile, and automatic profile optics.	As required.
GFAA	Clean contact cylinders, replace/clean tube, check lamp alignment.	As required.
CVAA	Change sample introduction tubing, change drying cell, re-zero detector.	As required.
Spectrophotometer	Check that cuvette has no scratch on its surface. Turn power off at the end of the day and warm up for at least one hour before use.	Daily. Daily
TOC Analyzer	Refresh phosphoric acid. Clean catalyst. Replace water in IC chamber.	Biweekly. As required. Biweekly.

12.0 SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS

Compliance with the QC objectives outlined in Section 3.0 will be monitored via two separate mechanisms. Precision and accuracy will be assessed through data. Compliance with the completeness objectives for field and laboratory data/measurement will be calculated by hand (field measurements) and electronically via a database subroutine (laboratory data). Information necessary to complete the precision and accuracy calculations will be provided in electronic and hardcopy form by the subcontract laboratory. Equations to be used for the precision, accuracy, and completeness assessment are outlined in the remainder of this section.

12.1 ACCURACY ASSESSMENT

To assure the accuracy of the analytical procedures, a minimum of 1 of every 20 samples is spiked with a known amount of the analyte or analytes to be evaluated. The spiked sample is then analyzed. The increase in concentration of the analyte observed in the spiked sample, because of the addition of a known quantity of the analyte, compared to the reported value of the same analyte in the unspiked sample determines the percent recovery. Control charts are plotted for each commonly analyzed compound and kept on matrix-specific and analyte-specific bases. The %R for a spiked sample is calculated according to the following formula:

$$\%R = \frac{\text{Amount in Spiked Sample} - \text{Amount in Sample}}{\text{Known Amount Added}} \text{ X } 100\,\%$$

12.2 PRECISION ASSESSMENT

Duplicate samples (for inorganic analyses) and MSD samples (for organic analyses) are prepared and analyzed at a minimum frequency of 1 per every 20 environmental samples. Duplicate samples are prepared by dividing an environmental sample into equal aliquots.

MSD samples are prepared by dividing an environmental sample into equal aliquots and then spiking each of the aliquots with a known amount of analyte. The duplicate samples are then included in the analytical sample set. The splitting of the sample allows the analyst to determine the precision of the preparation and analytical techniques associated with the duplicate samples. The RPD between the sample (or spike) and duplicate (or duplicate spike) is calculated and plotted. The RPD is calculated according to the following formula:

$$RPD = \frac{\text{Amount in Sample} - \text{Amount in Duplicate}}{0.5\ (\text{Amount in Sample} + \text{Amount in Duplicate})} \times 100\ \%$$

12.3 COMPLETENESS ASSESSMENT

Completeness is the ratio of the number of valid sample results to the total number of sample results expected to be obtained for the project as a whole. Following the completion of the analytical testing and data validation, the percent completeness will be calculated by the following equation:

$$\text{Completeness} = \frac{(\text{number of valid measurements})}{(\text{number of measurements planned})} \times 100\ \%$$

The results of the data validation process and the completeness assessment will be summarized in the Report using the summary format discussed in Section 9.3.2 and an electronic database subroutine.

13.0 CORRECTIVE ACTION

Under TtNUS' QA/QC program, it is required that any and all personnel noting conditions adverse to quality report these conditions immediately to the Project Manager and QAM. These parties, in turn, are charged with performing root-cause analyses and implementing appropriate corrective action in a timely manner. It is ultimately the responsibility of the QAM to document all findings and corrective actions taken and to monitor the effectiveness of the corrective measures performed.

13.1 FIELD CORRECTIVE ACTION

Field nonconformances or conditions adverse to quality must be identified and corrected as quickly as possible so that work integrity or quality of product is not compromised. The need for corrective action may arise based on deviations from Project Plans and procedures, adverse field conditions, or other unforeseen circumstances. Corrective action needs may become apparent during the performance of daily work tasks or as a consequence of internal or external field audits.

Corrective action may include resampling and may involve amending previously approved field procedures. If warranted by the severity of the problem (e.g., if a change in the approved Project Plan documents or SOPs is required), the Navy will be notified in writing via a Field Task Modification Request (FTMR), and Navy (in conjunction with USEPA Region IV and FDEP) approvals will be obtained. The FOL is responsible for initiating FTMRs; an FTMR will be initiated for all deviations from the Project Plan documents, as applicable. An example of an FTMR is provided as Figure 13-1. Copies of all FTMRs will be maintained with the onsite project planning documents and will be placed in the final evidence file.

Minor modifications to field activities such as a slight offset of a boring location will be initiated at the discretion of the FOL, subject to onsite approval by NAS – MAYPORT personnel. Approval for major modifications (e.g., elimination of a sampling point) must be obtained via an FTMR.

FIGURE 13-1

TETRA TECH NUS, INC.
FIELD TASK MODIFICATION REQUEST FORM

____________________ Client Identification	____________________ Project Number	____________________ FTMR Number

To________________________________ Location____________________ Date__________________

Description:

____
____
____
____

Reason for Change:

____
____
____
____

Recommended Disposition:

____
____
____
____

____
Field Operations Leader (Signature, if applicable) Date

Disposition:

____
____
____
____

____
Project Manager (Signature, if required) Date

____

Distribution:
Program Manager — Others as required____________________
Quality Assurance Officer — ____________________
Project Manager — ____________________
Field Operations Leader — ____________________

13.2 LABORATORY CORRECTIVE ACTION

In general, laboratory corrective actions are warranted whenever an out-of-control event or potential out-of-control event is noted. The specific corrective action taken depends on the specific analysis and the nature of the event. Generally, the following occurrences alert laboratory personnel that corrective action may be necessary:

- QC data are outside established warning or control limits;
- Method blank analyses yield concentrations of target analytes above acceptable levels;
- Undesirable trends are detected in spike recoveries or in duplicate RPDs;
- There is an unexplained change in compound detection capability;
- Inquiries concerning data quality are received; and
- Deficiencies are detected by laboratory QA staff audits or from performance evaluation sample test results.

Corrective actions are typically documented for out-of-control situations on a corrective action form. Using a corrective action form, any employee may notify the QA/QC Officer of a problem. The QA/QC Officer generally initiates the corrective action by relating the problem to the appropriate Laboratory Manager and/or Internal Coordinator, who then investigates or assigns responsibility for investigating the problem and its cause. Once determined, an appropriate corrective action is approved by the QA/QC Officer. Its implementation is verified and documented on the corrective action form and is further documented through audits.

13.3 CORRECTIVE ACTION DURING DATA REVIEW AND DATA ASSESSMENT

The need for corrective action may become apparent during data review, interpretation, or presentation activities, or problems may be identified as a result of oversight findings. The performance of rework, instituting a change in work procedures, or providing additional/refresher training are possible corrective actions relevant to data evaluation activities. The Project Manager will be responsible for approving the implementation of corrective action.

14.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

QA reports to management will be provided in three primary formats during the course of the NAS – MAYPORT sampling program. Data review letter reports will be prepared on a Sample Delivery Group-specific basis and will summarize QA issues for the subcontract laboratory data. In addition, written weekly reports summarizing accomplishments and QA/QC issues during the field investigation will be provided by the FOL. Finally, monthly progress reports are provided by the Project Manager. In addition, a summary of data review qualifiers and a completeness assessment for all project samples will be included in the Report.

14.1 CONTENTS OF PROJECT QUALITY ASSURANCE REPORTS

The contents of the specific QA reports are as follows. The data review reports address major and minor laboratory noncompliances as well as noted sample matrix effects. In the event that major problems occur with the analytical laboratory (e.g., holding time exceedences or calibration noncompliances, etc.) the Data Validation Coordinator will notify the Project Manager, the Technical Program Manager, and the Laboratory Services Coordinator. Such notifications (if necessary) are typically provided via internal memoranda and are placed in the project file. Such reports contain a summary of the noncompliance, a synopsis of the impact on individual projects, and recommendations regarding corrective action and compensational adjustments. Corrective actions are initiated at the program level.

The FOL will provide the Project Manager with weekly reports regarding accomplishments, deviations from the DMP, upcoming activities, and a QA summary during the course of the field investigation. In addition, monthly project review meetings are held for all active Navy CLEAN III projects. Issues discussed at the project review meeting include all aspects of budget and schedule compliance, and QA/QC problems. The Project Manager provides a monthly progress report to the Navy, which addresses the project budget, schedule, accomplishments, planned activities, required revisions of the QAPP, and QA/QC issues and intended corrective actions.

14.2 INDIVIDUALS RECEIVING/REVIEWING QUALITY ASSURANCE REPORTS

Data review QA Reports are provided to the Project Manager for inclusion in the project files. In the event that major problems are observed for a given laboratory, the Program Manager, Deputy Program Manager, QA Manager, Project Manager, and Laboratory Services Coordinator are provided with copies of the QA report. Weekly field progress reports are provided to the Project Manager. Monthly progress reports are provided to the Navy CLEAN III Program Manager and the Navy CLEAN III Contracting Officers Technical Representative.

APPENDIX C

FORMS

EQUIPMENT REQUISITION

PROJECT: ______________________ PROJECT NO.: ______________________

PROJECT MANAGER: ______________________ TODAY'S DATE: ______________________

FIELD TECHNICIAN: ______________________ DUE DATE: ______________________

EQUIPMENT MANAGER: ______________________ EST. RETURN DATE: ______________________

LOCATION/ SHIP TO: ______________________

☐ Do not bill TtNUS equipment daily through the sign-out period. Billing procedures to be followed are noted below.

☐ Apply Industrial Billing Rate

☐ Shipped by: ______________________

☐ Apply Gov't Billing/Shipping Rates

☐ Load In: ______________________

☐ Apply Other Billing Rates ______________________

ID No.	EQUIPMENT	QUANTITY OUT	CONDITION OUT	QUANTITY IN	CONDITION IN	BILLING RATE	COMMENTS
	MONITORING EQUIPMENT						
	HNU/PID						
	HNu eV probe						
	Isobutylene Calibration gas						
	HORIBA water quality checker						
	pH 4 Calibration solution						
	Draeger pump						
	Draeger tubes						
	LEL/O2						
	Pentane Calibration gas						
	OVA/FID						
	Methane Calibration gas						
	Mini-alert Radiation meter						
	Conductivity meter						
	Thermometer						
	ORP meter						
	Span gas regulator						
	PPE						
	Latex Disposable Gloves (Size)						
	Viton Gloves						
	Butyl Gloves (Size)						
	Cotton Gloves						
	Nitrile Gloves						
	Neoprene Gloves						
	Silvershield Gloves (Size)						
	Butyl Rubber Boots						
	Neoprene Rubber Boots (Size)						
	Latex Disposable Boots (Size)						
	Hard Hat						

EQUIPMENT REQUISITION

PROJECT: ____________________ PROJECT NO.: ____________________
PROJECT MANAGER: ____________________ TODAY'S DATE: ____________________
FIELD TECHNICIAN: ____________________ DUE DATE: ____________________
EQUIPMENT MANAGER: ____________________ EST. RETURN DATE: ____________________

LOCATION/ ____________________
SHIP TO: ____________________
____
____
____

☐ Do not bill TtNUS equipment daily through the sign-out period. Billing procedures to be followed are noted below.

☐ Apply Industrial Billing Rate

☐ Shipped by: ____________________

☐ Apply Gov't Billing/Shipping Rates

☐ Load In: ____________________

☐ Apply Other Billing Rates ____________________

ID No.	EQUIPMENT	QUANTITY OUT	CONDITION OUT	QUANTITY IN	CONDITION IN	BILLING RATE	COMMENTS
	Face shield						
	Tyvek Coveralls (Size)						
	PE Coveralls (Size)						
	Saranex Coveralls (Size)						
	PVC Coveralls (Size)						
	Safety Glasses - Clear / Tinted						
	Monogoggles						
	Earplugs						
RESPIRATORY PROTECTION							
	Disposable Dust Mask						
	Ultra twins-full face (S / M / L)						
	MSA Cleaner Sanitizer II						
	Ultra Twin Cartridge (Type:)						
	Air escape packs						
	SCBA units w/ tanks						
	SCBA, spare tank						
	SCBA mask						
WATER SAMPLING							
	Electronic water-level indicator (m-scope)						
	Popper						
	Oil/Water interface probe						
	Teflon Disposable Bailer						
	Stainless Steel Bailer						
	PVC disposable bailer						
	Polyrope 1000'						
	Peristaltic Pump						
	Silicon tubing						
	Teflon tubing	150'					
	0.45 micron filter						
	Teflon-coated stainless steel cable						

EQUIPMENT REQUISITION

PROJECT: ______________________ PROJECT NO.: ______________________

PROJECT MANAGER: ______________________ TODAY'S DATE: ______________________

FIELD TECHNICIAN: ______________________ DUE DATE: ______________________

EQUIPMENT MANAGER: ______________________ EST. RETURN DATE: ______________________

LOCATION/
SHIP TO: ______________________

☐ Do not bill TtNUS equipment daily through the sign-out period. Billing procedures to be followed are noted below.

☐ Shipped by: ______________________

☐ Load In: ______________________

☐ Apply Industrial Billing Rate

☐ Apply Gov't Billing/Shipping Rates

☐ Apply Other Billing Rates ______________________

ID No.	EQUIPMENT	QUANTITY OUT	CONDITION OUT	QUANTITY IN	CONDITION IN	BILLING RATE	COMMENTS
	PE tubing 3/4" x 100'						
	PE tubing 1/4" x 100'						
	PE tubing 1/4" x 1000'						
	Tygon tubing 3/8"						
	PACKAGING						
	Strapping tape						
	Clear tape						
	Duct tape						
	Aluminum foil						
	Class 9 Labels						
	Electrical tape						
	GENERAL						
	4 mil Plastic Roll (10' x 25')						
	Motorola 2-way radio						
	200' tape measure						
	Garbage bags, 20 gal						
	Garbage bags, 30-40 gal						
	Ziplock bags, 1 quart						
	Ziplock bags, 1 gallon						
	Paper towel						
	Spray paint						
	Caution tape						
	Vinyl flagging						
	Wooden Survey stakes						
	Survey pin flags						
	Tedlar bag						
	pH paper						
	medicine dropper						
	Bolt cutters						
	First-aid kit						

EQUIPMENT REQUISITION

PROJECT: ____________________ PROJECT NO.: ____________________
PROJECT MANAGER: ____________________ TODAY'S DATE: ____________________
FIELD TECHNICIAN: ____________________ DUE DATE: ____________________
EQUIPMENT MANAGER: ____________________ EST. RETURN DATE: ____________________

LOCATION/
SHIP TO: ____________________

☐ Do not bill TtNUS equipment daily through the sign-out period. Billing procedures to be followed are noted below.

☐ Apply Industrial Billing Rate

☐ Shipped by: ____________________

☐ Apply Gov't Billing/Shipping Rates

☐ Load In: ____________________

☐ Apply Other Billing Rates ____________________

ID No.	EQUIPMENT	QUANTITY OUT	CONDITION OUT	QUANTITY IN	CONDITION IN	BILLING RATE	COMMENTS
	Paper towels						
	Eyewash						
	Toolbox						
	Thermometer						
	DECONTAMINATION EQUIPMENT						
	Bailer brush						
	Long handle decon brush						
	Liquinox detergent						
	Teflon wash bottle 500 mL						
	Spray bottle						
	Wash tub						
	5 gal. bucket						
	3 gal. poly sprayer						
	SOIL SAMPLING						
	Stainless steel trowel						
	shovel						
	Disposable trowel						
	stainless steel bowl (Size)						
	Stainless steel auger						
	Stainless steel threaded cross handle						
	WATER						
	Steam Distilled (5 gal cube)						
	Reagent grade 20 L						
	HPLC water						
	OTHER						
	Hermit 2000 Datalogger						
	Hermit 1000 Datalogger						
	Transducer 20						
	Transducer 50						
	RS232 cable						

EQUIPMENT REQUISITION

PROJECT: ______________________ PROJECT NO.: ______________________

PROJECT MANAGER: ______________________ TODAY'S DATE: ______________________

FIELD TECHNICIAN: ______________________ DUE DATE: ______________________

EQUIPMENT MANAGER: ______________________ EST. RETURN DATE: ______________________

LOCATION/
SHIP TO: ______________________

☐ Do not bill TtNUS equipment daily through the sign-out period. Billing procedures to be followed are noted below.

☐ Apply Industrial Billing Rate

☐ Shipped by: ______________________

☐ Apply Gov't Billing/Shipping Rates

☐ Load In: ______________________

☐ Apply Other Billing Rates ______________________

ID No.	EQUIPMENT	QUANTITY OUT	CONDITION OUT	QUANTITY IN	CONDITION IN	BILLING RATE	COMMENTS
	Printer						
	2" Teflon slug						
	4" Teflon slug						

UNDERGROUND UTILITY LOCATION

Date of Request : ______________________

BRE Project # : ____________________

BRE Job Name : ____________________

Job Location : ____________________

____

____

UNCLE NOTICICATION : ____________________ Work Start Date : ______________
(REFERENCE # 12410)

UTILITY COMPANY	TICKET NUMBER	TELEPHONE NUMBER	DISPATCHER NAME	DATE CONTACTED	MEETING DATE	REMARKS
ELECTRIC :						
GAS :						
CABLE :						
WATER :						
SEWER :						
TELEPHONE :						

SOUTHERN DIVISION - NAVFACENGCOM
CERTIFICATE OF CONFORMANCE

Well Designation: ____________________

Site Name: ____________________

Date Installed: ____________________

Project Name: ____________________

Responsible Professional: ____________________

Drilling Company: ____________________

Driller: ____________________

Project Number: ____________________

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing			
Well Screen			
End Cap			
Drilling Fluid			
Drilling Fluid Additives			
Backfill Material			
Annular Filter Pack			
Bentonite Seal			
Annular Grout			
Surface Cement			
Protective Casing			
Paint			
Rod Lubricant			
Compressor Oil			

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Responsible Professional: ____________________

DAILY ACTIVITIES RECORD

PROJECT NAME: ______________________ PROJECT NUMBER: ____________

CLIENT: ______________________ LOCATION: ____________

DATE: ______________________ ARRIVAL TIME: ____________

B&RE PERSONNEL: ______________________ DEPARTURE TIME: ____________

CONTRACTOR: ______________________ DRILLER: ____________

ITEM	QUANTITY ESTIMATE	QUANTITY TODAY	PREVIOUS TOTAL QUANTITY	CUMULATIVE QUANTITY TO DATE
Mobiliztion/Demobilzation (each)				
4.25-inch HAS Drilling (foot)				
Rotary Wash Drilling (foot)				
Split-Spoon Samples (each)				
Shelby Tube Samples (each)				
2-inch MW Installation (foot)				
6-inch Surface Casing (foot)				
MW Development (hour)				
MW Surface Completion (each)				
IDW Containerization (drum)				
Decontamination (hour)				
Stand-by (hour)				

COMMENTS: ______________________

____

____

____

APPROVED BY:

______________________ ______________________

B&RE REPRESENTATIVE DRILLER

DATE: ____________

DAILY ACTIVITIES RECORD

PROJECT NAME: ______________________ **PROJECT NUMBER:** ____________

CLIENT: ______________________ **LOCATION:** ____________

DATE: ______________________ **ARRIVAL TIME:** ____________

B&RE PERSONNEL: ______________________ **DEPARTURE TIME:** ____________

CONTRACTOR: ______________________ **DRILLER:** ____________

ITEM	QUANTITY ESTIMATE	QUANTITY TODAY	PREVIOUS TOTAL QUANTITY	CUMULATIVE QUANTITY TO DATE

COMMENTS: ____

____

____

____

APPROVED BY:

______________________ ______________________

B&RE REPRESENTATIVE DRILLER

DATE: ____________

EQUIPMENT CALIBRATION LOG

INSTRUMENT NAME/MODE______________________ PROJECT NAME : ______________

MANUFACTURER : ______________________ PROJECT NUMBER : ______________

ALIBRATION DATE	INITIAL SETTINGS	STANDARDS USED	PROCEDURE	ADJUSTMENTS MADE	FINAL SETTINGS	SIGNATURE	COMMENTS

BORING LOG

Page ___ of ___

PROJECT NAME: ____________________ BORING NUMBER: ____________________
PROJECT NUMBER: ____________________ DATE: ____________________
DRILLING COMPANY: ____________________ GEOLOGIST: ____________________
DRILLING RIG: ____________________ DRILLER: ____________________

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION			USCS *	Remarks	PID/FID (ppm)			
					Soil Density/ Consistency or Rock Hardness	Color	Material Classification			Sample	Sampler BZ	Borehole**	Driller BZ**

When rock coring, enter rock brokeness.

* Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): ______

Remarks: ____

Converted to Well: Yes ______ No ______ Well I.D. #: ____________________

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: ______________________
Project No.: ______________________

[] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other: ______________________
[] QA Sample Type: ______________________

Sample ID No.: ______________
Sample Location: ______________
Sampled By: ______________
C.O.C. No.: ______________

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

MONITORING WELL DEVELOPMENT RECORD

Well: ____________________ Depth to Bottom (ft.): ____________ Responsible Personnel: ______________________________
Site: ____________________ Static Water Level Before (ft.): _______ Drilling Co.: ______________________________
Date Installed: ______________ Static Water Level After (ft.): ________ Project Name: ______________________________
Date Developed: _____________ Screen Length (ft.): ____________ Project Number: ______________________________
Dev. Method: ________________ Specific Capacity: ________________
Pump Type: _________________ Casing ID (in.): __________________

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)

GROUNDWATER LEVEL MEASUREMENT SHEET

Project: ____________________ Project No.: ____________
Location: ____________________ Personnel: ____________
Weather: ____________________ Measuring Device: ____________
Date: ____________________ Remarks: ____________

Well Number	Time	(A) Elevation of Reference Point (feet)*	(B) Water Level Indicator Reading (feet)*	=(A)-(B) Groundwater Elevation (feet)*	Total Well Depth (feet)*	Comments

Notes: ____

*All measurements to the nearest 0.01 foot

Page ____ of ____

FLORIDA

DEP Form # 62-770.900(3)
Form Title: Petroleum or Petroleum Products Water Sampling Log
Effective Date: September 23, 1997

Petroleum or Petroleum Products
Water Sampling Log

FDEP FACILITY NO.:	WELL NO.:	SAMPLE ID:	DATE: / /
SITE NAME:	SITE LOCATION:		

PURGE DATA

WELL DIAMETER (in):	TOTAL WELL DEPTH (ft):	DEPTH TO WATER (ft):	WELL CAPACITY (gal/ft):

1 WELL VOLUME (gal) = (TOTAL WELL DEPTH – DEPTH TO WATER) x WELL CAPACITY =

= (–) x =

PURGE METHOD:	PURGING INITIATED AT:	PURGING ENDED AT:
	PURGE RATE (gpm):	TOTAL VOLUME PURGED (gal):

WELL VOLS. PURGED	CUMUL. VOLUME PURGED (gal)	pH	TEMP. (°C)	COND. (µmhos)	COLOR	ODOR	APPEARANCE	OTHER

SAMPLING DATA

SAMPLED BY / AFFILIATION	SAMPLER(S) SIGNATURE(S)	
SAMPLING METHOD(S):	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
FIELD DECONTAMINATION: Y N	FIELD-FILTERED: Y N	DUPLICATE: Y N

SAMPLE CONTAINER SPECIFICATIONS			SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD
NO.	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOLUME ADDED IN FIELD (ml)	FINAL pH	

REMARKS:

MATERIAL CODES: AG = AMBER GLASS; CG = CLEAR GLASS; HDP = HIGH DENSITY POLYETHYLENE; O = OTHER (SPECIFY)

WELL CAPACITY: 1.25" = 0.06 gal/ft; 2" = 0.16 gal/ft; 4" = 0.65 gal/ft; 6" = 1.47 gal/ft; 8" = 2.61 gal/ft; 12" = 5.88 gal/ft

NOTE: this does not constitute all the information required by Chapter 62-160, F.A.C.

SAMPLE LOG SHEET
NATURAL ATTENUTAION PARAMETERS

Project Site Name: ______________________ Sample ID No.: ______________________

Project No.: ______________________ Sample Location: ______________________

Sampled By: ______________________ Duplicate: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Temp. (^0C)	Turbidity (NTU)	DO (Meter, mg/l)	Sal. (%)	
Date:								
Time:								
Method: Peristaltic pump								

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT

Analysis Time: ____________

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
________	x 0.01	=
________	x 0.02	=

Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT

Analysis Time: ____________

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	______ & ______	x 0.1	=
☐	40-160 mg/L	25 ml	0.1600 N	0.4	______ & ______	x 0.4	=
☐	100-400 mg/L	100 ml	1.600 N	1.0	______ & ______	x 1.0	=
☐	200-800 mg/L	50 ml	1.600 N	2.0	______ & ______	x 2.0	=
☐	500-2000 mg/L	20 ml	1.600 N	5.0	______ & ______	x 5.0	=
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	______ & ______	x 10.0	=

Relationship	Hydroxide	Carbonate	Bicarbonate
Concentration	mg/L	mg/L	mg/L

Notes:

Standard Additions: ☐ Titrant Molarity:________ Digits Required: 1st.:________ 2nd.:________ 3rd.:________

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT

Analysis Time: ____________

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
________	x 0.1	=
________	x 0.2	=
________	x 1.0	=
________	x 2.0	=

Notes:

Standard Additions: ☐ Titrant Molarity:________ Digits Required: 0.1ml:________ 0.2ml:________ 0.3ml:________

GROUNDWATER SAMPLE LOG SHEET
NATURAL ATTENUTAION PARAMETERS

Project Site Name: ______________________ Sample ID No.: ______________________

Project No.: ______________________ Sample Location: ______________________

Sampled By: ______________________ Duplicate: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide:

Equipment: HACH DR-890 Colorimeter HS-C Color Chart Analysis Time: __________

Program No.:

Concentration: __________ mg/L Filtered: ☐

Notes: ______________________

Ferrous Iron:

Equipment: HACH DR-890 Colorimeter IR-18C Color Wheel Analysis Time: __________

Program No.:

Concentration: __________ mg/L Filtered: ☐

Notes: ______________________

Nitrite:

Equipment: HACH DR-890 Colorimeter Analysis Time: __________

Program No.:

Concentration: __________ mg/L Reagent Blank Correction: ☐

Standard Solution: ☐ Results: __________

Notes: ______________________

Nitrate:

Equipment: HACH DR-890 Colorimeter Analysis Time: __________

Program No.:

Concentration: __________ mg/L

Nitrite Interference Treatment: ☐

Standard Solution: ☐ Results: ________ Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml:_______ 0.2ml:_______ 0.3ml:_______

Notes: ______________________

Chain of Custody Record

Page of

DEP Form #: 62-770.900(2)

Form Title: Chain of Custody Record

Effective Date: September 23, 1997

Company:

Address:

Phone: Fax:

FDEP Facility No.:

Project Name:

Sampling CompQAP No.:

Approval Date:

REQUESTED DUE DATE / /

Sampled by [Print Name(s)] / Affiliation

Sampler(s) Signature(s)

Item No.	Field ID No.	Sampled Date	Sampled Time	Grab or Composite	Matrix (see codes)	Number of Containers	Preservatives (see codes) / Analyses Requested									Remarks	Lab. No.

← Total Number of Containers

Shipment Method

Out: / /	Via:
Returned: / /	Via:

Additional Comments:

Item No.	Relinquished by / Affiliation	Date	Time	Accepted by / Affiliation	Date	Time

Cooler No.(s) / Temperature(s) (°C)	Sampling Kit No.	Equipment ID No.

MATRIX CODES: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water W = Water (Blanks) O = Other (specify)

PRESERVATIVE CODES: H = Hydrochloric acid + ice I = Ice only N = Nitric acid + ice S = Sulfuric acid + ice O = Other (specify)

APPENDIX D

TETRA TECH NUS, INC. – STANDARD OPERATING PROCEDURES

BROWN & ROOT ENVIRONMENTAL	STANDARD OPERATING PROCEDURES	Number CT-04	Page 1 of 6
		Effective Date 03/01/96	Revision 0
		Applicability B&R Environmental, NE	
		Prepared Risk Assessment Department	
Subject SAMPLE NOMENCLATURE		Approved D. Senovich	

TABLE OF CONTENTS

1.0 PURPOSE

The purpose of this document is to specify a consistent sample nomenclature system that will facilitate subsequent data management in a cost-effective manner. The sample nomenclature system has been devised such that the following objectives can be attained:

- Sorting of data by matrix.
- Sorting of data by depth.
- Maintenance of consistency (field, laboratory, and data base sample numbers).
- Accommodation of all project-specific requirements on a global basis.
- Accommodation of laboratory sample number length constraints (10 characters).

2.0 SCOPE

The methods described in this procedure shall be used consistently for all projects requiring electronic data handling managed by personnel located in the Northeast Region of Brown & Root Environmental (Pittsburgh, Wayne, Holt, and Wilmington) and for any large contracts managed by the Northeast Region (e.g., NORTHDIV CLEAN, SOUTHDIV CLEAN, ARCS I, ARCS III, etc.). Smaller projects (as determined by Project Manager) are outside the scope of this SOP.

3.0 GLOSSARY

None.

4.0 RESPONSIBILITIES

Program Manager - It shall be the responsibility of the Program Manager (or designee) to inform contract-specific Project Managers of the existence and requirements of this Standard Operating Procedure.

Project Manager - It shall be the responsibility of the Project Manager to determine the applicability of this Standard Operating Procedure based on: (1) program-specific requirements, and (2) project size and objectives. It shall be the responsibility of the Project Manager (or designee) to ensure that the sample nomenclature is thoroughly specified in the relevant project planning document (e.g., sampling and analysis plan) and is consistent with this Standard Operating Procedure if relevant. It shall be the responsibility of the project manager to ensure that the Field Operations Leader is familiar with the sample nomenclature system.

Field Operations Leader - It shall be the responsibility of the Field Operations Leader to ensure that all field technicians or sampling personnel are thoroughly familiar with this Standard Operating Procedure and the project-specific sample nomenclature system. It shall be the responsibility of the Field Operations Leader to ensure that the sample nomenclature system is used during all project-specific sampling efforts.

5.0 PROCEDURES

5.1 Introduction

The sample numbering system consists of 12 distinct alpha-numeric characters, only 10 of which will be provided to the laboratory on the sample labels and chain-of-custody forms. The sample number provided to the lab shall be as follows where "A" indicates "alpha," "N" indicates "numeric," and "E" indicates "either"):

$$\overline{E}\ \overline{E}\ \overline{E}\ \overline{A}\ \overline{A}\ \overline{E}\ \overline{E}\ \overline{E}\ \overline{N}\ \overline{N}$$

Once the analytical results are received from the laboratory the sample number will be revised by a subroutine such that the sample number is more user friendly (i.e., dashes will be inserted). The sample number will then appear as follows:

$$\overline{E}\ \overline{E}\ \overline{E}\ -\ \overline{A}\ \overline{A}\ -\ \overline{E}\ \overline{E}\ \overline{E}\ -\ \overline{N}\ \overline{N}$$

If multiple sampling events occur (or are planned) for a given matrix, a subroutine within the database will be used to append two additional characters such that the sample number will appear as follows:

$$\underbrace{\overline{E}\ \overline{E}\ \overline{E}}_{\text{Site}}\ -\ \underbrace{\overline{A}\ \overline{A}}_{\text{Type}}\ -\ \underbrace{\overline{E}\ \overline{E}\ \overline{E}}_{\text{Location}}\ -\ \underbrace{\overline{N}\ \overline{N}}_{\text{Depth}}\ -\ \underbrace{\overline{N}\ \overline{N}}_{\text{Round}}$$

5.2 Sample Number Field Requirements

The various fields in the sample number will include the following:

- Site Identifier
- Sample Type
- Sample Location
- Sample Depth Indicator
- Sampling Round

The site identifier must be a three-character field (numeric characters, alpha characters, or a mixture of alpha and numeric characters may be used). A site number is necessary since many facilities/sites have multiple individual sites, SWMUs, operable units, etc.

The sample type must be a two-character alpha field. Suggested codes are provided in Section 5.3 of this SOP.

The sample location must be a three-character field (alpha, numeric, or a mixture).

The depth field must be provided for all samples, regardless if it is strictly applicable (as discussed in Section 5.3).

The sampling round is optional, but, if provided, must be two numeric characters.

5.3 Example Sample Field Designations

Examples of each of the fields are as follows:

Site Number - Examples of site numbers/designations are as follows:

- A01 - Area of Concern Number 1
- 125 - Solid Waste Management Unit Number 125
- 000 - Base or Facility Wide Sample (e.g., upgradient well)
- BBG - Base Background

The examples cited are only suggestions. Each Project Manager (or designee) must designate appropriate (and consistent) site designations for their individual project.

Sample Type - Examples of sample types are as follows:

- AS - Air Sample
- BS - Biota Sample (See Note)
- CP - Composite Sample
- CS - Chip Sample
- DS - Drum Sample
- DU - Dust Sample
- FP - Free Product
- ID - Investigation Derived Waste Sample
- LT - Leachate Sample
- MW - Monitoring Well
- OF - Outfall Sample
- RW - Residential Well Sample
- SB - Soil Boring Sample
- SD - Sediment Sample
- SC - Scrape Sample
- SG - Soil Gas Sample
- SP - Seep Sample
- SS - Surface Soil Sample
- SU - Subsurface Soil Sample
- SW - Surface Water Sample
- TP - Test Pit Sample
- TW - Temporary Well Sample
- WC - Well Construction Material Sample
- WI - Wipe Sample
- WP - Well Point Sample
- WS - Waste/Sludge Sample

Note: The biota sample designation may be contingent upon the type of biota sampled (e.g., BL - Lobster; BF - Finfish; BC - Clam; BO - Oyster). Numerous other examples can be cited but will be site-specific.

This field will also be used to designate field Quality Control Samples, as follows:

TB - Trip Blank
FB - Field Blank
RB - Rinsate Blank (Equipment Blank)
BB - Bottle Blank
AB - Ambient Condition Blank

Field quality control samples should be numbered sequentially (e.g., RB-001; FB-010, etc.).

Filtered/unfiltered surface water or groundwater samples shall be handled in an separate manner, as subsequently discussed.

<u>Location</u> - Examples of the location field are as follows:

A01 - Grid node A1
001 - Monitoring Well 1

It is important that consistency be maintained with respect to the use of the characters "0" and O. Data base subroutines will not sort correctly if a mixture are used (e.g, AO1 and A02).

<u>Depth</u> - Formerly, depth specifications were indicated with a four digit field (e.g., 0002 - 0 to 2 feet). While this is effective for depth sorting, it is difficult to include this level of detail in a 10-character lab number (FormMaster limitations). In addition, this approach will not accommodate non-integer depths (e.g., 2.5 feet to 4.5 feet).

Based on such potential problems, the following approach shall be used: Sample depths will simply represent the horizon from which the sample was obtained: For example, if ten split-spoon samples are collected from a boring, they will be numbered 01 through 10. The sample log sheet will be used to record the specific depth of the sample, and this information will be entered in a separator field in the data base.

Similar nomenclature will be used for depth-specific surface water and sediment samples, etc. If no depth information is required (e.g., groundwater samples), the field must still be filled (e.g., Ø, Ø).

This field will also be used for the designation of filtered and unfiltered samples. An unfiltered groundwater sample shall be designated as U0, if and only if, a corresponding filtered sample is collected. Such as sample shall be designated as F0.

<u>Sampling Round</u> - The sampling round field is straightforward. It can range from 01 to 99.

5.4 <u>Example Sample Numbers</u>

Examples of complete sample numbers (field/data base versus laboratory) are as follows:

Field/Data Base ID	Lab ID	Description
101-SB-A01-01	101SBA0101	The first sample (e.g., 0 to 2 feet) from soil boring A01 (grid) at Site 101.
101-SB-A01-02	101SBA0102	The second sample from boring A01 (could be the next depth interval or a duplicate of 101-SB-A01-01).
125-MW-001-01-01	125MW00101	A groundwater sample from monitoring well MW001 (first sampling round)
125-MW-001-02-01	125MW00102	A duplicate groundwater sample from monitoring well MW001 (first sampling round)
130-MW-003-U1-01	130MW003U1	An unfiltered groundwater sample from monitoring well MW003 (first sampling round)
130-MW-003-F1-01	130MW003F1	A filtered groundwater sample from monitoring well MW003 (first sampling round)
137-RB-001-00-01	137RB00100	The first rinsate blank collected at site 137.
137-TB-004-00-02	137TB00400	The fourth trip blank collected during the second sampling event at Site 137.
155-SW-003-01-01	155SW00301	A surface water sample collected from the surface of a pond at Site 155.
155-SW-003-02-01	155SW00302	A surface water sample collected from the bottom of the water column in a pond at Site 155.

BROWN & ROOT ENVIRONMENTAL	STANDARD OPERATING PROCEDURES	Number: SA-6.1	Page: 1 of 23
		Effective Date: 03/01/96	Revision: 0
		Applicability: B&R Environmental, NE	
		Prepared: Earth Sciences Department	
Subject: NON-RADIOLOGICAL SAMPLE HANDLING		Approved: D. Senovich	

TABLE OF CONTENTS

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide information on sample preservation, packaging, and shipping procedures to be used in handling environmental samples submitted for chemical constituent, biological, or geotechnical analysis. Sample chain-of-custody procedures and other aspects of field documentation are addressed in SOP SA-6.3. Sample identification is addressed in SOP CT-04.

2.0 SCOPE

This procedure:

- Describes the appropriate containers to be used for samples depending on the analyses to be performed, and the steps necessary to preserve the samples when shipped off site for chemical analysis.
- Provides instruction for sample packaging and shipping in accordance with current U.S. Department of Transportation (DOT) regulations.

3.0 GLOSSARY

Hazardous Material - A substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated. Under 49 CFR, the term includes hazardous substances, hazardous wastes, marine pollutants, and elevated temperature materials, as well as materials designated as hazardous under the provisions of §172.101 and §172.102 and materials that meet the defining criteria for hazard classes and divisions in Part 173.

Hazardous Waste - Any substance listed in 40 CFR, Subpart D (y261.30 et seq.), or otherwise characterized as ignitable, corrosive, reactive, or toxic (as defined by Toxicity Characteristic Leaching Procedure, TCLP, analysis) as specified under 40 CFR, Subpart C (y261.20 et seq.), that would be subject to manifest requirements specified in 40 CFR 262. Such substances are defined and regulated by EPA.

Marking - A descriptive name, identification number, instructions, cautions, weight, specification or UN marks, or combination thereof required on outer packaging of hazardous materials.

n.o.i - Not otherwise indicated (may be used interchangeably with n.o.s.).

n.o.s. - Not otherwise specified.

ORM - Other regulated material (see DOT 49 CFR 173.144).

Packaging - A receptacle and any other components or materials necessary for compliance with the minimum packaging requirements of 49 CFR 174, including containers (other than freight containers or overpacks), portable tanks, cargo tanks, tank cars, and multi-unit tank-car tanks to perform a containment function in conformance with the minimum packaging requirements of 49 CFR 173.24(a) & (b).

Placard - Color-coded, pictorial sign which depicts the hazard class symbol and name and which is placed on the side of a vehicle transporting certain hazardous materials.

Common Preservatives:

- Hydrochloric Acid - HCl
- Sulfuric Acid - H_2SO_4
- Nitric Acid - HNO_3
- Sodium Hydroxide - NaOH

Other Preservatives

- Zinc Acetate
- Sodium Thiosulfate - $Na_2S_2O_3$

Normality (N) - Concentration of a solution expressed as equivalent per liter, an equivalent being the amount of a substance containing 1 gram-atom of replaceable hydrogen or its equivalent. Thus, a one-molar solution of HCl, containing 1 gram-atom of H, is "one normal," whereas a one-molar solution of H_2SO_4, containing 2 gram-atoms of H, is "two normal."

Reportable Quantity (RQ) - For the purposes of this SOP, means the quantity specified in column 3 of the Appendix to DOT 49 CFR §172.101 for any material identified in column 1 of the appendix. A spill greater than the amount specified must be reported to the National Response Center.

Sample - A sample is physical evidence collected from a facility or the environment, which is representative of conditions at the location and time of collection.

4.0 RESPONSIBILITIES

Field Operations Leader - Directly responsible for the bottling, preservation, labeling, packaging, shipping, and custody of samples up to and including release to the shipper.

Field Samplers - Responsible for initiating the Chain-of-Custody Record (per SOP SA-6.3), implementing the packaging and shipping requirements, and maintaining custody of samples until they are relinquished to another custodian or to the common carrier.

5.0 PROCEDURES

Sample identification, labeling, documentation, and chain-of-custody are addressed by SOP SA-6.3.

5.1 Sample Containers

Different types of chemicals react differently with sample containers made of various materials. For example, trace metals adsorb more strongly to glass than to plastic, whereas many organic chemicals may dissolve various types of plastic containers. Attachments A and B show proper containers (as well as other information) per 40 CFR 136. In general, the sample container shall allow approximately 5-10 percent air space ("ullage") to allow for expansion/vaporization if the sample warms during transport. However, for collection of volatile organic compounds, head space shall be omitted. The analytical laboratory will generally provide certified-clean containers for samples to be analyzed for chemical constituents. Shelby tubes or other sample containers are generally provided by the driller for samples requiring geotechnical analysis. Sufficient lead time shall be allowed for a delivery of bottle orders. Therefore, it is critical to use the correct container to maintain the integrity of the sample prior to analysis.

Once opened, the container must be used at once for storage of a particular sample. Unused but opened containers are to be considered contaminated and must be discarded; because of the potential for introduction of contamination, they cannot be reclosed and saved for later use. Likewise, any unused containers which appear contaminated upon receipt, or which are found to have loose caps or a missing Teflon liner (if required for the container), shall be discarded.

5.2 Sample Preservation

Many water and soil samples are unstable and therefore require preservation to prevent changes in either the concentration or the physical condition of the constituent(s) requiring analysis. Although complete and irreversible preservation of samples is not possible, preservation does retard the chemical and biological changes that inevitably take place after the sample is collected. Preservation techniques are usually limited to pH control, chemical addition(s), and refrigeration/ freezing (certain biological samples only).

5.2.1 Overview

The preservation techniques to be used for various analytes are listed in Attachments A and B. Reagents required for sample preservation will either be added to the sample containers by the laboratory prior to their shipment to the field or be added in the field (in a clean environment). Only high purity reagents shall be used for preservation. In general, aqueous samples of low-concentration organics (or soil samples of low- or medium-concentration organics) are cooled to 4°C. Medium-concentration aqueous samples and high-hazard organics samples are typically not preserved. Low-concentration aqueous samples for metals are acidified with HNO_3, whereas medium-concentration and high-hazard aqueous metal samples are not preserved. Low- or medium-concentration soil samples for metals are cooled to 4°C, whereas high-hazard samples are not preserved.

The following subsections describe the procedures for preparing and adding chemical preservatives. Attachments A and B indicate the specific analytes which require these preservatives.

5.2.2 Preparation and Addition of Reagents

Addition of the following acids or bases may be specified for sample preservation; these reagents shall be analytical reagent (AR) grade or purer and shall be diluted to the required concentration with deionized water before field sampling commences. To avoid uncontrolled reactions, be sure to Add Acid to water (not vice versa). A dilutions guide is provided below.

Acid/Base	Dilution	Concentration	Estimated Amount Required for Preservation
Hydrochloric Acid (HCl)	1 part concentrated HCl: 1 part double-distilled, deionized water	6N	5-10 mL
Sulfuric Acid (H_2SO_4)	1 part concentrated H_2SO_4: 1 part double-distilled, deionized water	18N	2 - 5 mL
Nitric Acid (HNO_3)	Undiluted concentrated HNO_3	16N	2 - 5 mL
Sodium Hydroxide (NaOH)	400 grams solid NaOH dissolved in 870 mL double-distilled, deionized water; yields 1 liter of solution	10N	2 mL

The amounts required for preservation shown in the above table assumes proper preparation of the preservative and addition of the preservative to one liter of aqueous sample (assuming that the sample is initially at pH 7, is poorly buffered, and does not contain particulate matter; as these conditions vary, more preservative may be required). Consequently, the final sample pH must be checked using narrow-range pH paper, as described in the generalized procedure detailed below:

- Pour off 5-10 mL of sample into a dedicated, clean container. Use some of this sample to check the initial sample pH using wide range (0-14) pH paper. Never dip the pH paper into the sample; always apply a drop of sample to the pH paper using a clean stirring rod or pipette.

- Add about one-half of the estimated preservative required to the original sample bottle. Cap and invert gently several times to mix. Check pH (as described above) using medium range pH paper (pH 0-6 or pH 7.5-14, as applicable).

- Cap sample bottle and seal securely.

Additional considerations are discussed below:

- To test if ascorbic acid must be used to remove oxidizing agents present in the sample before it can be properly preserved, place a drop of sample on KI-starch paper. A blue color indicates the need for ascorbic acid addition.

  If required, add a few crystals of ascorbic acid to the sample and retest with the KI-starch paper. Repeat until a drop of sample produces no color on the KI-starch paper. Then add an additional 0.6 grams of ascorbic acid per each liter of sample volume.

  Continue with proper base preservation of the sample as described, generally, above.

- Samples for sulfide analysis must be treated by the addition of 4 drops (0.2 mL) of 2N zinc acetate solution per 100 ml of sample.

  The 2N zinc acetate solution is made by dissolving 220 grams of zinc acetate in 870 mL of double-distilled, deionized water to make 1 liter of solution.

  The sample pH is then raised to 9 using the NaOH preservative.

- To test of sodium thiosulfate must be added to remove residual chlorine from a sample, test the sample for residual chlorine using a field test kit especially made for this purpose.

  If residual chlorine is present, add 0.08 grams of sodium thiosulfate per liter of sample to remove the residual chlorine.

  Continue with proper acidification of the sample as described, generally, above.

For biological samples, 10% buffered formalin or isopropanol may also be required for preservation. Questions regarding preservation requirements should be resolved through communication with the laboratory <u>before</u> sampling begins.

5.3 Field Filtration

At times, field-filtration may be required to provide for the analysis of dissolved chemical constituents. Field-filtration must be performed prior to the preservation of samples as described above. General procedures for field filtration are described below:

- The sample shall be filtered through a non-metallic, 0.45-micron membrane filter, immediately after collection. The filtration system shall consist of dedicated filter canister, dedicated silicon tubing, and a peristaltic pump with pressure or vacuum pumping squeeze action (since the sample is filtered by mechanical peristalsis, the sample travels only through the tubing).

- To perform filtration, thread the silicon tubing through the peristaltic pump head. Attach the filter canister to the discharge end of the silicon tubing (note flow direction arrow); attach the aqueous sample container to the intake end of the silicon tubing. Turn the peristaltic pump on and perform filtration.

- Continue by preserving the filtrate (contained in the filter canister), as applicable and generally described above.

5.4 Sample Packaging and Shipping

Samples collected for shipment from a site shall be classified as either environmental or hazardous material samples. Samples from drums containing materials other than Investigative Derived Waste (IDW) and samples obtained from waste piles or bulk storage tanks are generally shipped as hazardous materials. A distinction must be made between the two types of samples in order to:

- Determine appropriate procedures for transportation of samples (if there is any doubt, a sample shall be considered hazardous and shipped accordingly.)

- Protect the health and safety of transport and laboratory personnel receiving the samples (special precautions are used by the shipper and at laboratories when hazardous materials are received.)

Detailed procedures for packaging environmental and hazardous material samples are outlined in the remainder of this section.

5.4.1 Environmental Samples

Environmental samples are packaged as follows:

- Place sample container, properly identified and with lid securely fastened in a plastic bag (e.g. Ziploc baggie), and seal the bag.

- Place sample in a cooler constructed of sturdy material which has been lined with a large, plastic (e.g. "garbage" bag).

- Pack with enough noncombustible, absorbent, cushioning materials such as vermiculite (shoulders of bottles must be iced if required) to minimize the possibility of the container breaking.

- If cooling is required (see Attachments A and B), double-bag ice in Ziploc baggies and place around container shoulders, and on top of absorbent packing material (minimum of 8 pounds of ice for a medium-size cooler).

- Seal (i.e., tape or tie top in knot) large liner bag.

- The original (top, signed copy) and extra carbonless copies of the COC form shall be placed inside a large Ziploc-type bag and taped inside the lid of the shipping cooler. If multiple coolers are sent but are included on one COC form, the COC form should be sent with the first cooler. The COC form should then state how many coolers are included with that shipment.

- Close and seal outside of cooler as described in SOP SA-6.3. Signed custody seals must be used.

Coolers must be marked as containing "Environmental Samples." The appropriate side of the container must be marked "This End Up" and arrows placed appropriately. No DOT marking or labeling is required; there are no DOT restrictions on mode of transportation.

5.4.2 Determination of Shipping Classification for Hazardous Material Samples

Samples not determined to be environmental samples, or samples known or expected to contain hazardous materials, must be considered hazardous material samples and transported according to the requirements listed below.

5.4.2.1 <u>Known Substances</u>

If the substance in the sample is known or can be identified, package, mark, label, and ship according to the specific instructions for that material (if it is listed) in the DOT Hazardous Materials Table, 49 CFR 172.101. (DOT Guide for shippers can be found in Attachment D of this document.)

To determine the proper shipping name, use the following steps to help locate the shipping name on the Hazardous Materials Table, DOT 49 CFR 172.101.

1. Look first for the chemical or technical name of the material, for example, ethyl alcohol. Note that many chemicals have more than one technical name, for example, perchloroethylene (not listed in 172.101) is listed as tetrachloroethylene (listed 172.101). It may be useful to consult a chemist for all possible technical names a material can have. If your material is not listed by its technical name, then . . .

2. Look for the chemical family name For example, pentyl alcohol is not listed but the chemical family name is: alcohol, n.o.s. (not otherwise specified). If the chemical family name is not listed, then . . .

3. Look for a generic name based on end use. For example, Paint, n.o.s or Fireworks, n.o.s. If a generic name based on end use is not listed, then . . .

4. Look for a generic family name based on end use, for example, drugs, n.o.s. or cosmetics, n.o.s. Finally, if your material is not listed by a generic family name but you suspect or know the material is hazardous because it meets the definition of one or more hazardous classes, then . . .

5. You will have to use the general hazard class for a proper shipping name. For example, Flammable Liquid, n.o.s, or Oxidizer, n.o.s.

5.4.2.2 Unknown Substances

For samples of hazardous substances of unknown content, select the appropriate transportation category according to the DOT hazardous materials classification of a material having more than one hazard. This procedure is outlined in DOT Regulation 49 CFR 173.2a. (This can be found in Attachment C of this SOP.)

The correct shipping classification for an unknown sample is selected through a process of elimination, as outlined in DOT Regulation 49 CFR 172.101(c)(11). By using the provisions in this paragraph, the proper shipping name and description will be determined. A step-by-step guide is provided by the Department of Transportation (DOT) and can be found in Attachment D of this SOP.

5.4.3 Packaging and Shipping of Samples Classified as Flammable Liquid (or Solid)

5.4.3.1 Packaging

Applying the word "flammable" to a sample does not imply that it is in fact flammable. The word prescribes the class of packaging according to DOT regulations.

1. Containerize sample as required (see Attachments A and B). To prevent leakage, fill container no more than 90 percent full. Seal lid with teflon tape or wire.

2. Complete sample label and attach securely to sample container.

3. Seal container and place in 2-mil-thick (or thicker) polyethylene bag (e.g., Ziploc baggie), one sample per bag. Position sample identification label so that it can be read through bag. Seal bag.

4. For soil jars, place sealed bag inside metal can (available from laboratory or laboratory supplier) and cushion it with enough noncombustible, absorbent material (for example, vermiculite or diatomaceous earth) between the bottom and sides of the can and bag to prevent breakage and absorb leakage. Pack one bag per can. Use clips, tape, or other positive means to hold can lid securely, tightly and permanently. Mark can as indicated in Paragraph 1 of Section 5.3.4.2, below. Single 1-gallon bottles do not need to be placed in metal cans.

5. Place one or more metal cans (or a single 1-gallon bottle) into a strong outside container, such as a metal picnic cooler or a DOT-approved fiberboard box. Surround cans (or bottle) with noncombustible, absorbent cushioning materials for stability during transport. The absorbent material should be able to absorb the entire contents of the container. Mark container as indicated in Paragraph 2 below.

5.4.3.2 Marking/Labeling

1. Use abbreviations only where specified. Place the following information, either hand-printed or in label form, on the metal can (or 1-gallon bottle):

   - Laboratory name and address.

- Proper shipping name from the hazardous materials table (DOT Regulation CFR 49 172.101). Example: "Flammable Liquid, n.o.s. UN1993" or "Flammable Solid, n.o.s. UN1325." This will include packing group (see Section 5.3.4.2, No. 2.)

Not otherwise specified (n.o.s) is not used if the flammable liquid (or solid) is identified. If identified, the name of the specific material is listed before the category (for example, Acetone, Flammable Liquid), followed by its appropriate UN number found in the DOT Hazardous Materials table (49 CFR 172.101).

2. Determine packing group. The packing group is part of the proper shipping name and must be included on the shipping papers in the description section.

   I. Most Hazardous
   II. Medium Hazard
   III. Least Hazardous

   The packing group will be listed in the hazardous materials table, column 5.

3. Place all information on outside shipping container as on can (or bottle), specifically:

   - Proper shipping name
   - UN or NA number
   - Proper label(s)
   - Addressee and sender

   Place the following labels on the outside shipping container: "Cargo Aircraft Only" and DOT label such as: "Flammable Liquid" (or "Flammable Solid"). "Dangerous When Wet" label shall be used if the Flammable Solid has not been exposed to a wet environment. "Laboratory Samples" and "THIS SIDE UP" or "THIS END UP" shall also be marked on the top of the outside container, and upward-pointing arrows shall be placed on all four sides of the container.

5.4.3.3 <u>Shipping Papers</u>

1. Use abbreviations only where specified. Complete the carrier-provided bill of lading and sign certification statement. Provide the following information in the order listed (one form may be used for more than one exterior container):

   - Proper shipping name. (Example: "Flammable Liquid, n.o.s. UN1993" or "Flammable Solid, n.o.s. UN1325 Packing Group I, II, III").
   - "Limited Quantity" (or "Ltd. Qty."). (See No. 3, below.)
   - "Cargo Aircraft Only."
   - Net weight (wt) or net volume (vol), just before or just after "Flammable Liquid, n.o.s." or "Flammable Solid, n.o.s.," by item, if more than one metal can is inside an exterior container.
   - "Laboratory Samples" (if applicable).

2. Include Chain-of-Custody Record, properly executed in outside container; use custody seals.

3. "Limited Quantity" means the maximum amount of a hazardous material for which there is a specific labeling or packaging exception (DOT CFR 49 171.8). This may mean that packages are exempted from labeling requirements. To determine if your sample meets the Limited Quantity Exception, refer to DOT Regulation CFR 49 Subpart C 173.50 through 173.156. First, determine the proper classification and shipping name for the material; then refer to the exception requirements for that particular class of material beginning with 173.50.

   Example: "Flammable Liquid n.o.s. UN1993 Packing Group 1." The outer package can weigh no more than 66 pounds gross weight. The inner package or container can weigh no more than 0.1 gallon net capacity for each container.

   To determine whether the material can be shipped as a "Limited Quantity," you must check the specific requirement for that class of material.

5.4.3.4 Transportation

1. The majority of unknown hazardous substance samples will be classified as flammable liquids. The samples will be transported by rented or common carrier truck, railroad, or express overnight package services. Do not transport samples on any passenger-carrying air transport system, even if the system has cargo-only aircraft. DOT regulations permit regular airline cargo-only aircraft, but difficulties with most suggest avoiding them. Instead, ship by airline carriers that carry only cargo. If unsure of what mode of transportation to use, consult the FOL or Project Manager.[1]

2. For transport by government-owned vehicle, including aircraft, DOT regulations do not apply. However, procedures described above, with the exception of execution of the bill of lading with certification, shall still be followed.

3. Use the hazardous materials shipping check list (Attachment E) as a guidance to ensure that all sample-handling requirements are satisfied.

4. In some cases, various materials may react if they break during shipment. To determine if you are shipping such materials, refer to the DOT compatibility chart in Attachment F.

5.5 Shipment of Lithium Batteries

Monitoring well data are analyzed using either the Hermit SE 1000 or the Hermit SE 2000 environmental data logger. These instruments are powered by lithium batteries. The Department of Transportation has determined that lithium batteries are a hazardous material and are to be shipped using the following information:

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[1] Note: If you are unsure as how to ship the sample (hazardous or environmental sample), contact the FOL or Project Manager so that a decision can be made as to the proper shipping practices. The DOT penalties for improper shipment of a hazardous material are stringent and may include a prison term for intentional violations.

- Product Designation
  - Hermit SE 1000
  - Hermit SE 2000

- DOT Proper Shipping Name
  - Lithium batteries, contained in equipment, UN3091

- Classification or Division
  - Class 9

Shipment of equipment containing lithium batteries must be accompanied by shipping papers completed as indicated in Attachment G. The instrument will be shipped by Federal Express as a Hazardous Material. Place the instrument in the same container in which it was received. This container or case is a DOT-approved shipping container. For Federal Express procedures to ship hazardous materials, call 1-800-238-5355, extension 922-1666. In most cases, the return shipping papers and DOT labels will be shipped to you from the company warehouse or the vendor. An example of the types of labels used for shipment and the wording are shown in Attachment G. These labels will be attached to the outside container with the following wording:

- Lithium Batteries Contained in Equipment
  - UN-3091
  - Shipped Under CA-9206009

6.0 REFERENCES

American Public Health Association, 1981. Standard Methods for the Examination of Water and Wastewater, 15th Edition. APHA, Washington, D.C.

U.S. Department of Transportation, 1993. Hazardous Materials Regulations, 49 CFR 171-177.

U.S. EPA, 1984. "Guidelines Establishing Test Procedures for the Analysis of Pollutants under Clean Water Act." Federal Register, Volume 49 (209), October 26, 1984, p. 43234.

U.S. EPA, 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, U.S. EPA-EMSL, Cincinnati, Ohio.

ATTACHMENT A

GENERAL SAMPLE CONTAINER AND PRESERVATION REQUIREMENTS

Sample Type and Concentration		Container[1]	Sample Size	Preservation[2]	Holding Time[2]
WATER					
Organics (GC&GC/MS)	VOC Low	Borosilicate glass	2 x 40 mL	Cool to 4°C HCl to $\leq$ 2	14 days[8]
	Extractables (Low SVOCs and pesticide/PCBs)	Amber glass	2x2 L or 4x1 L	Cool to 4°C	7 days to extraction; 40 days after extraction
	Extractables (Medium SVOCs and pesticide/PCBs)	Amber glass	2x2 L or 4x1 L	None	7 days to extraction; 40 days after extraction
Inorganics	Metals Low	High-density polyethylene	1 L	HNO_3 to pH $\leq$2	6 months (Hg-28 days)
	Medium	Wide-mouth glass	16 oz.	None	6 months
	Cyanide Low	High-density polyethylene	1 L	NaOH to pH>12	14 days
	Cyanide Medium	Wide-mouth glass	16 oz.	None	14 days
Organic/ Inorganic	High Hazard	Wide-mouth glass	8 oz.	None	14 days
SOIL					
Organics (GC&GC/MS)	VOC	Wide-mouth glass with teflon liner	2 x 4 oz.	Cool to 4°C	14 days
	Extractables (Low SVOCs and pesticides/PCBs)	Wide-mouth glass	8 oz.	Cool to 4°C	14 days to extraction; 40 days after extraction
	Extractables (Medium SVOCs and pesticides/PCBs)	Wide-mouth glass	8 oz.	Cool to 4°C	14 days to extraction; 40 days after extraction
Inorganics	Low/Medium	Wide-mouth glass	8 oz.	Cool to 4°C	6 months (Hg - 28 days) Cyanide (14 days)
Organic/ Inorganic	High Hazard	Wide-mouth glass	8 oz.	None	NA
Dioxin/Furan	All	Wide-mouth glass	4 oz.	None	7 days until extraction; 40 days after extraction
TCLP	All	Wide-mouth glass	8 oz.	None	7 days until preparation; analysis as per fraction
AIR					
Volatile Organics	Low/Medium	Charcoal tube – 7 cm long, 6 mm OD, 4 mm ID	100 L air	Cool to 4°C	5 days recommended

(1) All glass containers should have Teflon cap liners or septa.
(2) See Attachment E. Preservation and maximum holding time allowances per 40 CFR 136.

ATTACHMENT B

ADDITIONAL REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES

Parameter Number/Name	Container(1)	Preservation(2)(3)	Maximum Holding Time(4)
INORGANIC TESTS:			
Acidity	P, G	Cool, 4°C	14 days
Alkalinity	P, G	Cool, 4°C	14 days
Ammonia - Nitrogen	P, G	Cool, 4°C; H_2SO_4 to pH 2	28 days
Biochemical Oxygen Demand (BOD)	P, G	Cool, 4°C	48 hours
Bromide	P, G	None required	28 days
Chemical Oxygen Demand (COD)	P, G	Cool, 4°C; H_2SO_4 to pH 2	28 days
Chloride	P, G	None required	28 days
Chlorine, Total Residual	P, G	None required	Analyze immediately
Color	P, G	Cool, 4°C	48 hours
Cyanide, Total and Amenable to Chlorination	P, G	Cool, 4°C; NaOH to pH 12; 0.6 g ascorbic acid(5)	14 days(6)
Fluoride	P	None required	28 days
Hardness	P, G	HNO_3 to pH 2; H_2SO_4 to pH 2	6 months
Total Kjeldahl and Organic Nitrogen	P, G	Cool, 4°C; H_2SO_4 to pH 2	28 days
Nitrate - Nitrogen	P, G	None required	48 hours
Nitrate-Nitrite - Nitrogen	P, G	Cool, 4°C; H_2SO_4 to pH 2	28 days
Nitrite - Nitrogen	P, G	Cool, 4°C	48 hours
Oil & Grease	G	Cool, 4°C; H_2SO_4 to pH 2	28 days
Total Organic Carbon (TOC)	P, G	Cool, 4°C; HCl or H_2SO_4 to pH 2	28 days
Orthophosphate	P, G	Filter immediately; Cool, 4°C	48 hours
Oxygen, Dissolved-Probe	G Bottle & top	None required	Analyze immediately
Oxygen, Dissolved-Winkler	G Bottle & top	Fix on site and store in dark	8 hours
Phenols	G	Cool, 4°C; H_2SO_4 to pH 2	28 days
Phosphorus, Total	P, G	Cool, 4°C; H_2SO_4 to pH 2	28 days
Residue, Total	P, G	Cool, 4°C	7 days
Residue, Filterable (TDS)	P, G	Cool, 4°C	7 days
Residue, Nonfilterable (TSS)	P, G	Cool, 4°C	7 days
Residue, Settleable	P, G	Cool, 4°C	48 hours
Residue, Volatile (Ash Content)	P, G	Cool, 4°C	7 days
Silica	P	Cool, 4°C	28 days
Specific Conductance	P, G	Cool, 4°C	28 days
Sulfate	P, G	Cool, 4°C	28 days

ATTACHMENT B
ADDITIONAL REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES
PAGE TWO

Parameter Number/Name	Container[1]	Preservation[2][3]	Maximum Holding Time[4]
INORGANIC TESTS (Cont'd):			
Sulfide	P, G	Cool, 4°C; add zinc acetate plus sodium hydroxide to pH 9	7 days
Sulfite	P, G	None required	Analyze immediately
Turbidity	P, G	Cool, 4°C	48 hours
METALS:[7]			
Chromium VI (Hexachrome)	P, G	Cool, 4°C	24 hours
Mercury (Hg)	P, G	HNO_3 to pH 2	28 days
Metals, except Chromium VI and Mercury	P, G	HNO_3 to pH 2	6 months
ORGANIC TESTS:[8]			
Purgeable Halocarbons	G, Teflon-lined septum	Cool, 4°C; 0.008% $Na_2S_2O_3$[5]	14 days
Purgeable Aromatic Hydrocarbons	G, Teflon-lined septum	Cool, 4°C; 0.008% $Na_2S_2O_3$[5] HCl to pH 2 [9]	14 days
Acrolein and Acrylonitrile	G, Teflon-lined septum	Cool, 4°C; 0.008% $Na_2S_2O_3$[5] adjust pH to 4-5 [10]	14 days
Phenols[11]	G, Teflon-lined cap	Cool, 4°C; 0.008% $Na_2S_2O_3$[5]	7 days until extraction; 40 days after extraction
Benzidines[11], [12]	G, Teflon-lined cap	Cool, 4°C; 0.008% $Na_2S_2O_3$[5]	7 days until extraction[13]
Phthalate esters[11]	G, Teflon-lined cap	Cool, 4°C	7 days until extraction; 40 days after extraction
Nitrosamines[11], [14]	G, Teflon-lined cap	Cool, 4°C; store in dark; 0.008% $Na_2S_2O_3$[5]	7 days until extraction; 40 days after extraction
PCBs[11]	G, Teflon-lined cap	Cool, 4°C	7 days until extraction; 40 days after extraction
Nitroaromatics & Isophorone[11]	G, Teflon-lined cap	Cool, 4°C; 0.008% $Na_2S_2O_3$[5]; store in dark	7 days until extraction; 40 days after extraction
Polynuclear Aromatic Hydrocarbons (PAHs)[11],[14]	G, Teflon-lined cap	Cool, 4°C; 0.008% $Na_2S_2O_3$[5]; store in dark	7 days until extraction; 40 days after extraction
Haloethers[11]	G, Teflon-lined cap	Cool, 4°C; 0.008% $Na_2S_2O_3$[5]	7 days until extraction; 40 days after extraction
Dioxin/Furan (TCDD/TCDF)[11]	G, Teflon-lined cap	Cool, 4°C; 0.008% $Na_2S_2O_3$[5]	7 days until extraction; 40 days after extraction

ATTACHMENT B
ADDITIONAL REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES
PAGE THREE

Parameter Number/Name	Container(1)	Preservation(2)(3)	Maximum Holding Time(4)
RADIOLOGICAL TESTS:			
1-5 Alpha, beta and radium	P, G	HNO_3 to pH 2	6 months

(1) Polyethylene (P): generally 500 ml or Glass (G): generally 1L.
(2) Sample preservation should be performed immediately upon sample collection. For composite chemical samples each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then chemical samples may be preserved by maintaining at 4°C until compositing and sample splitting is completed.
(3) When any sample is to be shipped by common carrier or sent through the United States Mail, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR Part 172).
(4) Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid. Samples may be held for longer periods only if the permittee, or monitoring laboratory, has data on file to show that the specific types of samples under study are stable for the longer periods, and has received a variance from the Regional Administrator.
(5) Should only be used in the presence of residual chlorine.
(6) Maximum holding time is 24 hours when sulfide is present. Optionally, all samples may be tested with lead acetate paper before pH adjustments are made to determine if sulfide is present. If sulfide is present, it can be removed by the addition of cadmium nitrate powder until a negative spot test is obtained. The sample is filtered and then NaOH is added to pH 12.
(7) Samples should be filtered immediately on site before adding preservative for dissolved metals.
(8) Guidance applies to samples to be analyzed by GC, LC, or GC/MS for specific compounds.
(9) Sample receiving no pH adjustment must be analyzed within 7 days of sampling.
(10) The pH adjustment is not required if acrolein will not be measured. Samples for acrolein receiving no pH adjustment must be analyzed within 3 days of sampling.
(11) When the extractable analytes of concern fall within a single chemical category, the specified preservative and maximum holding times should be observed for optimum safeguard of sample integrity. When the analytes of concern fall within two or more chemical categories, the sample may be preserved by cooling to 4°C, reducing residual chlorine with 0.008% sodium thiosulfate, storing in the dark, and adjusting the pH to 6-9; samples preserved in this manner may be held for 7 days before extraction and for 40 days after extraction. Exceptions to this optional preservation and holding time procedure are noted in footnote 5 (re: the requirement for thiosulfate reduction of residual chlorine) and footnotes 12, 13 (re: the analysis of benzidine).
(12) If 1,2-diphenylthydrazine is likely to be present, adjust the pH of the sample to 4.0±0.2 to prevent rearrangement to benzidine.
(13) Extracts may be stored up to 7 days before analysis if storage is conducted under an inert (oxidant-free) atmosphere.
(14) For the analysis of diphenylnitrosamine, add 0.008% $Na_2S_2O_3$ and adjust pH to 7-10 with NaOH within 24 hours of sampling.
(15) The pH adjustment may be performed upon receipt at the laboratory and may be omitted if the samples are extracted within 72 hours of collection. For the analysis of aldrin, add 0.008% $Na_2S_2O_3$.

ATTACHMENT C

DOT HAZARDOUS MATERIAL CLASSIFICATION
(49 CFR 173.2a)

1. Radioactive material (except a limited quantity)
2. Division 2.3, Poisonous Gases
3. Division 2.1, Flammable Gas
4. Division 2.2, Nonflammable gas
5. Division 6.1, Poisonous Liquids, Packing Group 1 (poison by inhalation only)
6. Division 4.2, Pyrophoric Material
7. Division 4.1, Self-Reactive Material
8. Class 3, Flammable Liquids*
9. Class 8, Corrosive Material
10. Division 4.1, Flammable Solid*
11. Division 4.2, Spontaneously Combustible Materials*
12. Division 4.3, Dangerous When Wet Materials*
13. Division 5.1, Oxidizers*
14. Division 6.1, Poisonous Liquids or Solids (other than Packing Group 1)*
15. Combustible liquid
16. Class 9, Miscellaneous Hazardous Materials

* If a material has or meets the criteria for more than one hazard class, use the precedence of hazardous table on the following page for Classes 3 and 8 and Divisions 4.1, 4.2, 4.3, 5.1, and 6.1. The following table ranks those materials that meet the definition of Classes 3 and 8 and Divisions 4.1, 4.2, 4.3, 5.1, and 6.1.

ATTACHMENT C (Continued)

PRECEDENCE OF HAZARD TABLE

(Hazard Class and Packing Group)

Class	Packing Group	4.2	4.3	5.1 I[a]	5.1 II[a]	5.1 III[a]	6.1 I (Dermal)	6.1 I (Oral)	6.1 II	6.1 III	8 I (Liquid)	8 I (Solid)	8 II (Liquid)	8 II (Solid)	8 III (Liquid)	8 III (Solid)
3	I						3	3	3	3	3	[c]	3	[c]	3	[c]
3	II						3	3	3	3	8	[c]	3	[c]	3	[c]
3	III						6.1	6.1	6.1	3[d]	8	[c]	8	[c]	3	[c]
4.1	II[b]	4.2	4.3	5.1	4.1	4.1	6.1	6.1	4.1	4.1	[c]	8	[c]	4.1	[c]	4.1
4.1	III[b]	4.2	4.3	5.1	4.1	4.1	6.1	6.1	6.1	4.1	[c]	8	[c]	8	[c]	4.1
4.2	II		4.3	5.1	4.2	4.2	6.1	6.1	4.2	4.2	[c]	8	[c]	4.2	[c]	4.2
4.2	III		4.3	5.1	4.2	4.2	6.1	6.1	6.1	4.2	[c]	8	[c]	8	[c]	4.2
4.3	I			5.1	4.3	4.3	6.1	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
4.3	II			5.1	4.3	4.3	6.1	4.3	4.3	4.3	8	8	8	4.3	4.3	4.3
4.3	III			5.1	4.3	4.3	6.1	6.1	6.1	4.3	8	8	8	8	4.3	4.3
5.1	I[a]						5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
5.1	II[a]						6.1	5.1	5.1	5.1	8	8	8	5.1	5.1	5.1
5.1	III[a]						6.1	6.1	6.1	5.1	8	8	8	8	5.1	5.1
6.1	I, Dermal										8	6.1	6.1	6.1	6.1	6.1
6.1	I, Oral										8	6.1	6.1	6.1	6.1	6.1
6.1	II, Inhalation										8	6.1	6.1	6.1	6.1	6.1
6.1	II, Dermal										8	6.1	8	6.1	6.1	6.1
6.1	II, Oral										8	8	8	6.1	6.1	6.1
6.1	III										8	8	8	8	8	8

[a] There are at present no established criteria for determining Packing Groups for liquids in Division 5.1. At present, the degree of hazard is to be assessed by analogy with listed substances, allocating the substances to Packing Group I, Great; Group II, Medium; or Group III, Minor Danger.

[b] Substances of Division 4.1 other than self-reactive substances.

[c] Denotes an impossible combination.

[d] For pesticides only, where a material has the hazards of Class 3, Packing Group III, and Division 6.1, Packing Group III, the primary hazard is Division 6.1, Packing Group III.

ATTACHMENT D

GUIDE FOR HAZARDOUS MATERIALS SHIPPERS

USE OF GUIDE - This guide is presented as an aid to shippers of hazardous materials. It does not contain or refer to all of the DOT requirements for shipping hazardous materials. For specific details, refer to all of the DOT requirements for shipping hazardous materials, as provided in the Code of Federal Regulations (CFR), Title 49, Transportation, Parts 100-199.

The following is offered as a step-by-step procedure to aid in compliance with the applicable DOT regulations.

STEP 1 - DETERMINE THE PROPER SHIPPING NAME. The shipper must determine the proper shipping name of the materials as listed in the Hazardous Materials Table, 49 CFR 172.101, Column (2).

STEP 2 - DETERMINE THE HAZARD CLASS OR CLASSES.

a. Refer to the Table, 49 CFR 172.101, Column (3), and locate the hazard class of the material.
b. If more than one class is shown for the proper shipping name, determine the proper class by definition.
c. If the materials have more than one hazard, classify the material based on the order of hazards in 49 CFR 173.2.

STEP 3 - SELECT THE PROPER IDENTIFICATION NUMBERS.

a. Refer to the Table, 49 CFR 172.101, Column (3a), and select the Identification Number (ID) that corresponds to the proper shipping name and hazard class.
b. Enter the ID number(s) on the shipping papers and display them, as required, on packagings, placards and/or orange panels.

STEP 4 - DETERMINE THE MODE(S) OF TRANSPORT TO ULTIMATE DESTINATION.

a. As a shipper, you must assure yourself that the shipment complies with various modal requirements.
b. The modal requirements may affect the following: (1) Packaging; (2) Quantity per Package; (3) Marking; (4) Labeling; (5) Shipping Papers; and (6) Certification.

STEP 5 - SELECT THE PROPER LABEL(S) AND APPLY AS REQUIRED.

a. Refer to the Table, 49 CFR 172.101, Column (4) for required labels.
b. For details on labeling refer to (1) Additional Labels, 49 CFR 172.402; (2) Placement of Labels, 49 CFR 172.406; (3) Packagings (Mixed or Consolidated), 49 CFR 172.404(a) and (h); (4) Packages Containing Samples, 49 CFR 172.402(h); (5) Radioactive Materials, 49 CFR 172.403; and (6) Authorized Label Modifications, 49 CFR 172.405.

STEP 6 - DETERMINE AND SELECT THE PROPER PACKAGES.

a. Refer to the Table, 49 CFR 172.101, Column (5a) for exceptions and Column (5b) for specification packagings. Consider the following when selecting an authorized package: Quantity per Package; Cushioning Material, if required; Proper Closure and Reinforcement; Proper Pressure; Outage; etc., as required.
b. If packaged by a prior shipper, make sure the packaging is correct and in proper condition for transportation.

ATTACHMENT D (Continued)
GUIDE FOR HAZARDOUS MATERIALS SHIPPERS

STEP 7 - MARK THE PACKAGING (INCLUDING OVERPACKS).

a. Apply the required markings (49 CFR 172.300); Proper shipping name and ID number, when required (49 CFR 172.301); Name and address of Consignee or Consignor (49 CFR 172.306).
b. For details and other required markings, see 49 CFR 172.300 through 172.338.

STEP 8 - PREPARE THE SHIPPING PAPERS.

a. The basic requirements for preparing shipping papers include Proper Shipping Name; Hazard Class; ID Number; Total Quantity; Shipper's Certification; and Emergency Response Telephone Number.
b. Make all entries on the shipping papers using the information required and in proper sequence (49 CFR 172.202).

STEP 9 - CERTIFICATION.

a. Each shipper must certify by printing (manually or mechanically) on the shipping papers that the materials being offered for shipment are properly classified, described, packaged, marked and labeled, and in proper condition for transportation according to the applicable DOT Regulations (49 CFR 172.202).

STEP 10 - LOADING, BLOCKING, AND BRACING. When hazardous materials are loaded into the transport vehicle or freight container, each package must be loaded, blocked, and braced in accordance with the requirements for mode of transport.

a. If the shipper loads the freight container or transport vehicle, the shipper is responsible for the proper loading, blocking, and bracing of the materials.
b. If the carrier does the loading, the carrier is responsible.

STEP 11 - DETERMINE THE PROPER PLACARD(S). Each person who offers hazardous materials for transportation must determine that the placarding requirements have been met.

a. For Highway, unless the vehicle is already correctly placarded, the shipper must provide the required placard(s) and required ID number(s) (49 CFR 172.506).
b. For Rail, if loaded by the shipper, the shipper must placard the rail car if placards are required (49 CFR 172.508).
c. For Air and Water shipments, the shipper has the responsibility to apply the proper placards.

STEP 12 - HAZARDOUS WASTE/HAZARDOUS SUBSTANCE.

a. If the material is classed as a hazardous waste or hazardous substance, most of the above steps will be applicable.
b. Pertinent Environmental Protection Agency regulations are found in the Code of Federal Regulations, Title 40, Part 262.

As a final check and before offering the shipment for transportation, visually inspect your shipment. The shipper should ensure that emergency response information is on the vehicle for transportation of hazardous materials.

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Revised March 1995.

ATTACHMENT E

HAZARDOUS MATERIALS SHIPPING CHECK LIST

PACKAGING

1. Check DOT 173.24 for appropriate type of package for hazardous substance.
2. Check for container integrity, especially the closure.
3. Check for sufficient absorbent material in package.
4. Check for sample tags and log sheets for each sample and for chain-of-custody record.

SHIPPING PAPERS

1. Check that entries contain only approved DOT abbreviations.
2. Check that entries are in English.
3. Check that hazardous material entries are specially marked to differentiate them from any nonhazardous materials being sent using same shipping paper.
4. Be careful that all hazardous classes are shown for multiclass materials.
5. Check total amounts by weight, quantity, or other measures used.
6. Check that any limited-quantity exemptions are so designated on the shipping paper.
7. Check that certification is signed by shipper.
8. Make certain driver signs for shipment.

RCRA MANIFEST

1. Check that approved state/federal manifests are prepared.
2. Check that transporter has the following: valid EPA identification number, valid driver's license, valid vehicle registration, insurance protection, and proper DOT labels for materials being shipped.
3. Check that destination address is correct.
4. Check that driver knows where shipment is going.
5. Check that the driver is aware of emergency procedures for spills and accidents.
6. Make certain driver signs for shipment.
7. Make certain one copy of executed manifest and shipping document is retained by shipper.

ATTACHMENT F

DOT SEGREGATION AND SEPARATION CHART

Class or Division	Notes	1.1-1.2	1.3	1.4	1.5	1.6	2.1	2.2	2.3 gas Zone A*	2.3 gas Zone B*	3	4.1	4.2	4.3	5.1	5.2	6.1 liquids PG-I Zone A*	7	8 liquids only
Explosives .... 1.1 and 1.2	A	*	*	*	*	*	X	X	X	X	X	X	X	X	X	X	X	X	X
Explosives 1.3		*	*	*	*	*	X		X	X	X		X	X	X	X	X		X
Explosives 1.4		*	*	*	*	*	O		O	O	O		O				O		O
Very insensitive explosives 1.5	A	*	*	*	*	*	X	X	X	X	X	X	X	X	X	X	X	X	X
Extremely insensitive explosives 1.6		*	*	*	*	*													
Flammable gases 2.1		X	X	O	X				X	O							O	O	
Non-toxic, non-flammable gases 2.2		X			X														
Poisonous gas - Zone A** 2.3		X	X	O	X		X				X	X	X	X	X	X			X
Poisonous gas - Zone B** 2.3		X	X	O	X		O				O	O	O	O	O	O			O
Flammable liquids 3		X	X	O	X				X	O					O		X		
Flammable solids 4.1		X			X				X	O							X		O
Spontaneously combustible materials 4.2		X	X	O	X				X	O							X		X
Dangerous-when-wet materials 4.3		X	X		X				X	O							X		O
Oxidizers 5.1	A	X	X		X				X	O	O						X		O
Organic peroxides 5.2		X	X		X				X	O							X		O
Poisonous liquids PG I - Zone A** .. 6.1		X	X	O	X		O				X	X	X	X	X	X			X
Radioactive materials 7		X			X		O												
Corrosive liquids 8		X	X	O	X				X	O		O	X	O	O	O	X		

No entry means that the materials are compatible (have no restrictions).

X These materials may not be loaded, transported, or stored together in the same vehicle or facility.
O The materials may not be loaded, transported, or stored together in the same vehicle or facility unless they are separated for 4 feet on all sides.
* Check the explosives compatibility chart in 49 CFR 179.848(f).
A Ammonium nitrate fertilizers may be stored with Division 1.1 materials.
** Denotes inhalation hazardous for poisons; consult field team leader or project manager if you encounter a material in this class before shipment.

ATTACHMENT G
LITHIUM BATTERY SHIPPING PAPERS

3224637861

Two completed and signed copies of this Declaration must be handed to the operator.

WARNING

Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent.

TRANSPORT DETAILS

This shipment is within the limitations prescribed for: *(delete non applicable)*

~~PASSENGER AND CARGO AIRCRAFT~~ | CARGO AIRCRAFT ONLY

Airport of Departure:

Airport of Destination: 19CYS

Shipment type: *(delete non-applicable)* NON-RADIOACTIVE | ~~RADIOACTIVE~~

NATURE AND QUANTITY OF DANGEROUS GOODS

Dangerous Goods Identification						
Proper Shipping Name	Class or Division	UN or ID No.	Subsidiary Risk	Quantity and type of packing	Packing Inst.	Authorization
LITHIUM BATTERIES CONTAINED IN EQUIPMENT	9	UN3091		1 PLASTIC BOX X 55 GRAMS	912 II	PER CA-9206009

Additional Handling Information

1 HERMIT SERIES DATALOGGER X 55 GRAMS (11 GRAMS/CELL)

I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in the proper condition for transport by air according to the applicable International and National Government Regulations.

Name/Title of Signatory

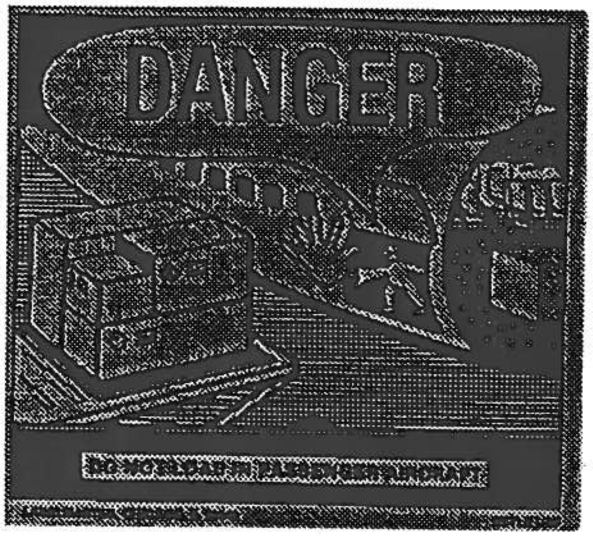
Place and Date

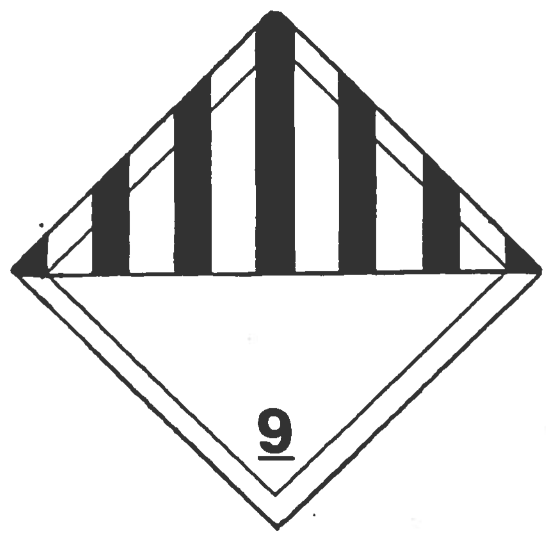
Signature *(see warning above)*

Emergency Telephone Number (Required for US Origin or Destination Shipments): 800-535-5053

IF ACCEPTABLE FOR PASSENGER AIRCRAFT, THIS SHIPMENT CONTAINS RADIOACTIVE MATERIAL INTENDED FOR USE IN, OR INCIDENT TO, RESEARCH, MEDICAL DIAGNOSIS, OR TREATMENT.

ATTACHMENT G (CONTINUED)
LITHIUM BATTERY SHIPPING PAPERS





LITHIUM BATTERIES CONTAINED IN EQUIPMENT.
UN-3091.
SHIPPED UNDER CA-9206009

BROWN & ROOT ENVIRONMENTAL	STANDARD OPERATING PROCEDURES	Number: SA-6.3	Page: 1 of 32
		Effective Date: 03/01/96	Revision: 0
		Applicability: B&R Environmental, NE	
		Prepared: Earth Sciences Department	
Subject: FIELD DOCUMENTATION		Approved: D. Senovich	

TABLE OF CONTENTS

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ATTACHMENTS (EXAMPLES) **PAGE**

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to identify and designate the field data record forms, logs and reports generally initiated and maintained for documenting Brown & Root Environmental field activities.

2.0 SCOPE

Documents presented within this procedure (or equivalents) shall be used for all Brown & Root Environmental field activities, as applicable. Other or additional documents may be required by specific client contracts.

3.0 GLOSSARY

None

4.0 RESPONSIBILITIES

Project Manager - The Project Manager is responsible for obtaining hardbound, controlled-distribution logbooks (from the appropriate source), as needed. In addition, the Project Manager is responsible for placing all forms used in site activities (i.e., records, field reports, and upon the completion of field work, the site logbook) in the project's central file.

Field Operations Leader (FOL) - The Field Operations Leader is responsible for ensuring that the site logbook, notebooks, and all appropriate forms and field reports illustrated in this guideline (and any additional forms required by the contract) are correctly used, accurately filled out, and completed in the required time-frame.

5.0 PROCEDURES

5.1 Site Logbook

5.1.1 General

The site logbook is a hard-bound, paginated controlled-distribution record book in which all major onsite activities are documented. At a minimum, the following activities/events shall be recorded (daily) in the site logbook:

- All field personnel present
- Arrival/departure of site visitors
- Arrival/departure of equipment
- Start or completion of borehole/trench/monitoring well installation or sampling activities
- Daily onsite activities performed each day
- Sample pickup information
- Health and Safety issues (level of protection observed, etc.)
- Weather conditions

A site logbook shall be maintained for each project. The site logbook shall be initiated at the start of the first onsite activity (e.g., site visit or initial reconnaissance survey). Entries are to be made for every day that onsite activities take place which involve Brown & Root Environmental or subcontractor personnel. Upon completion of the fieldwork, the site logbook must become part of the project's central file.

The following information must be recorded on the cover of each site logbook:

- Project name
- Brown & Root Environmental project number
- Sequential book number
- Start date
- End date

Information recorded daily in the site logbook need not be duplicated in other field notebooks (see Section 5.2), but must summarize the contents of these other notebooks and refer to specific page locations in these notebooks for detailed information (where applicable). An example of a typical site logbook entry is shown in Attachment A.

If measurements are made at any location, the measurements and equipment used must either be recorded in the site logbook or reference must be made to the site notebook in which the measurements are recorded (see Attachment A).

All logbook, notebook, and log sheet entries shall be made in indelible ink (black pen is preferred). No erasures are permitted. If an incorrect entry is made, the data shall be crossed out with a single strike mark, and initialed and dated. At the completion of entries by any individual, the logbook pages used must be signed and dated. The site logbook must also be signed by the Field Operations Leader at the end of each day.

5.1.2 Photographs

When movies, slides, or photographs are taken of a site or any monitoring location, they must be numbered sequentially to correspond to logbook entries. The name of the photographer, date, time, site location, site description, and weather conditions must be entered in the logbook as the photographs are taken. A series entry may be used for rapid-sequence photographs. The photographer is not required to record the aperture settings and shutter speeds for photographs taken within the normal automatic exposure range. However, special lenses, films, filters, and other image-enhancement techniques must be noted in the logbook. If possible, such techniques shall be avoided, since they can adversely affect the admissibility of photographs as evidence. Chain-of-custody procedures depend upon the subject matter, type of film, and the processing it requires. Film used for aerial photography, confidential information, or criminal investigation require chain-of-custody procedures. Adequate logbook notation and receipts must be compiled to account for routine film processing. Once processed, the slides of photographic prints shall be consecutively numbered and labeled according to the logbook descriptions. The site photographs and associated negatives must be docketed into the project's central file.

5.2 <u>Site Notebooks</u>

Key field team personnel may maintain a separate dedicated notebook to document the pertinent field activities conducted directly under their supervision. For example, on large projects with multiple investigative sites and varying operating conditions, the Health and Safety Officer may elect to maintain a separate site notebook. Where several drill rigs are in operation simultaneously, each site geologist assigned to oversee a rig must maintain a site notebook.

5.3 Sample Forms

A summary of the forms illustrated in this procedure is shown as the listing of Attachments in the Table of Contents for this SOP. Forms may be altered or revised for project-specific needs contingent upon client approval. Care must be taken to ensure that all essential information can be documented. Guidelines for completing these forms can be found in the related sampling SOP.

5.3.1 Sample Collection, Labeling, Shipment and Request for Analysis

5.3.1.1 Sample Log Sheet

Sample Log Sheets are used to record specified types of data while sampling. Attachments B-1 to B-4 are examples of Sample Log Sheets. The data recorded on these sheets are useful in describing the waste source and sample as well as pointing out any problems encountered during sampling. A log sheet must be completed for each sample obtained, including field quality control (QC) samples.

5.3.1.2 Sample Label

A typical sample label is illustrated in Attachment B-5. Adhesive labels must be completed and applied to every sample container. Sample labels can usually be obtained from the appropriate Program source or are supplied from the laboratory subcontractor.

5.3.1.3 Chain-of-Custody Record Form

The Chain-of-Custody (COC) Record is a multi-part form that is initiated as samples are acquired and accompanies a sample (or group of samples) as they are transferred from person to person. This form must be used for any samples collected for chemical or geotechnical analysis whether the analyses are performed on site or off site. One part of the completed COC form is retained by the field crew while the other two or three portions are sent to the laboratory. The original (top, signed copy) and extra carbonless copies of the COC form shall be placed inside a large Ziploc-type bag and taped inside the lid of the shipping cooler. If multiple coolers are sent but are included on one COC form, the COC form should be sent with the first cooler. The COC form should then state how many coolers are included with that shipment. An example of a Chain-of-Custody Record form is provided as Attachment B-6. A supply of these forms are purchased and stocked by the field department of the various Brown & Root Environmental offices. Alternately, COC forms supplied by the laboratory may be used. Once the samples are received at the laboratory, the sample cooler and contents are checked and any problems are noted on the enclosed COC form (any discrepancies between the sample labels and COC form and any other problems that are noted are resolved through communication between the laboratory point-of-contact and the Brown & Root Environmental Project Manager). The COC form is signed and one of the remaining two parts are retained by the laboratory while the last part becomes part of the samples' corresponding analytical data package. Internal laboratory chain-of-custody procedures are documented in the Laboratory Quality Assurance Plan (LQAP).

5.3.1.4 Chain-of-Custody Seal

Attachment B-7 is an example of a custody seal. The Custody seal is also an adhesive-backed label. It is part of a chain-of-custody process and is used to prevent tampering with samples after they have been collected in the field and sealed in coolers for transit to the laboratory. The COC seals are signed and dated by the samplers and affixed across the opening edges of each cooler containing environmental samples. COC seals may be available from the laboratory; these seals may also be purchased from a supplier.

5.3.2 Geohydrological and Geotechnical Forms

5.3.2.1 Groundwater Level Measurement Sheet

A groundwater level measurement sheet, shown in Attachment C-1 must be filled out for each round of water level measurements made at a site.

5.3.2.2 Data Sheet for Pumping Test

During the performance of a pumping test (or an in-situ hydraulic conductivity test), a large amount of data must be recorded, often within a short time period. The pumping test data sheet (Attachment C-2) facilitates this task by standardizing the data collection format, and allowing the time interval for collection to be laid out in advance.

5.3.2.3 Packer Test Report Form

A packer test report form shown in Attachment C-3 must be completed for each well upon which a packer test is conducted following well installation.

5.3.2.4 Summary Log of Boring

During the progress of each boring, a log of the materials encountered, operation and driving of casing, and location of samples must be kept. The Summary Log of Boring (Attachment C-4) is used for this purpose and must be completed for each soil boring performed. In addition, if volatile organics are monitored on cores, samples or cuttings from the borehole (using HNU or OVA detectors), these results must be entered on the boring log (under the "Remarks" column) at the appropriate depth. The "Remarks" column can also be used to subsequently enter the laboratory sample number and the concentration of a few key analytical results. This feature allows direct comparison of contaminant concentrations with soil characteristics.

5.3.2.5 Monitoring Well Construction Details Form

A Monitoring Well Construction Details Form must be completed for every monitoring well piezometer or temporary well point installed. This form contains specific information on length and type of well riser pipe and screen, backfill, filter pack, annular seal and grout characteristics, and surface seal characteristics. This information is important in evaluating the performance of the monitoring well, particularly in areas where water levels show temporal variation, or where there are multiple (immiscible) phases of contaminants. Depending on the type of monitoring well (in overburden or bedrock), different forms are used (see Attachments C-5 through C-9). Similar forms are used for flush-mount well completions. The Monitoring Well Construction Details Form is not a controlled document.

5.3.2.6 Test Pit Log

When a test pit or trench is constructed for investigative or sampling purposes, a Test Pit Log (Attachment C-10) must be filled out by the responsible field geologist or sampling technician.

5.3.3 Equipment Calibration and Maintenance Form

The calibration or standardization of monitoring, measuring or test equipment is necessary to assure the proper operation and response of the equipment, to document the accuracy, precision or sensitivity of the measurement, and determine if correction should be applied to the readings. Some items of equipment require frequent calibration, others infrequent. Some are calibrated by the manufacturer, others by the user.

Each instrument requiring calibration has its own Equipment Calibration Log (Attachment D) which documents that the manufacturer's instructions were followed for calibration of the equipment, including frequency and type of standard or calibration device. An Equipment Calibration Log must be maintained for each electronic measuring device used in the field; entries must be made for each day the equipment is used.

5.4 Field Reports

The primary means of recording onsite activities is the site logbook. Other field notebooks may also be maintained. These logbooks and notebooks (and supporting forms) contain detailed information required for data interpretation or documentation, but are not easily useful for tracking and reporting of progress. Furthermore, the field logbook/notebooks remain onsite for extended periods of time and are thus not accessible for timely review by project management.

5.4.1 Weekly Status Reports

To facilitate timely review by project management, Xeroxed copies of logbook/notebook entries may be made for internal use. To provide timely oversight of onsite contractors, Daily Activities Reports are completed and submitted as described below.

It should be noted that in addition to the summaries described herein, other summary reports may also be contractually required.

5.4.2 Daily Activities Report

5.4.2.1 Description

The Daily Activities Report (DAR) documents the activities and progress for each day's field work. This report must be filled out on a daily basis whenever there are drilling, test pitting, well construction, or other related activities occurring which involve subcontractor personnel. These sheets summarize the work performed and form the basis of payment to subcontractors (Attachment E is an example of a Daily Activities Report).

5.4.2.2 Responsibilities

It is the responsibility of the rig geologist to complete the DAR and obtain the driller's signature acknowledging that the times and quantities of material entered are correct.

5.4.2.3 Submittal and Approval

At the end of the shift, the rig geologist must submit the Daily Activities Report to the Field Operations Leader (FOL) for review and filing. The Daily Activities Report is not a formal report and thus requires no further approval. The DAR reports are retained by the FOL for use in preparing the site logbook and in preparing weekly status reports for submission to the Project Manager.

6.0 ATTACHMENTS

ATTACHMENT A
TYPICAL SITE LOGBOOK ENTRY

START TIME: ____________________ DATE: ____________________

SITE LEADER: ____

PERSONNEL:

BROWN & ROOT ENV.	DRILLER	EPA
______________	______________	______________
______________	______________	______________
______________	______________	______________

WEATHER: Clear, 68°F, 2-5 mph wind from SE

ACTIVITIES:

1. Steam jenney and fire hoses were set up.
2. Drilling activities at well ____ resumes. Rig geologist was ____________. See Geologist's Notebook, No. 1, page 29-30, for details of drilling activity. Sample No. 123-21-S4 collected; see sample logbook, page 42. Drilling activities completed at 11:50 and a 4-inch stainless steel well installed. See Geologist's Notebook, No. 1, page 31, and well construction details for well _____.
3. Drilling rig No. 2 steam-cleaned at decontamination pit. Then set up at location of well ______.
4. Well _____ drilled. Rig geologist was _________________. See Geologist's Notebook, No. 2, page ____ for details of drilling activities. Sample numbers 123-22-S1, 123-22-S2, and 123-22-S3 collected; see sample logbook, pages 43, 44, and 45.
5. Well _____ was developed. Seven 55-gallon drums were filled in the flushing stage. The well was then pumped using the pitcher pump for 1 hour. At the end of the hour, water pumped from well was "sand free."
6. EPA remedial project manger arrives on site at 14:25 hours.
7. Large dump truck arrives at 14:45 and is steam-cleaned. Backhoe and dump truck set up over test pit ________.
8. Test pit _______ dug with cuttings placed in dump truck. Rig geologist was _____________. See Geologist's Notebook, No. 1, page 32, for details of test pit activities. Test pit subsequently filled. No samples taken for chemical analysis. Due to shallow groundwater table, filling in of test pit ___ resulted in a very soft and wet area. A mound was developed and the area roped off.
9. Express carrier picked up samples (see Sample Logbook, pages 42 through 45) at 17:50 hours. Site activities terminated at 18:22 hours. All personnel off site, gate locked.

____
Field Operations Leader

ATTACHMENT B-1
EXAMPLE GROUNDWATER SAMPLE LOG SHEET

GROUNDWATER

SAMPLE LOG SHEET

Page ____ of ____

Project Site Name: ______________________

Project No.: ______________________

- ☐ Domestic Well Data
- ☐ Monitoring Well Data
- ☐ Other Well Type: ______________________
- ☐ QA Sample Type: ______________________

Sample ID No.: ______________________

Sample Location: ______________________

Sampled By: ______________________

C.O.C. No.: ______________________

Sampling Data

Date: / Time: / Method:	pH	S.C.	Temp. (°C)	Turbidity	Color	TBD	TBD	TBD

Purge Data

	Volume	pH	S.C.	Temp. (°C)	Turbidity	Color	TBD	TBD
Date: / Method:	Initial							
Monitor Reading (ppm):	1							
Well Casing Dia. & Material Type:	2							
	3							
Total Well Depth (TD):	4							
Static Water Level (WL):	5							
TD-WL (ft.) =								
One Casing Volume: (gal/L)								
Start Purge (hrs.):								
End Purge (hrs.):								
Total Purge Time (min):								
Total Amount Purged (gal/L):								

Analysis	Preservative	Container Requirements	Collected (✓)

Observations/Notes:

Circle If Applicable:		Signature(s):
MS/MSD	Duplicate ID No:	

TBD: To Be Determined

ATTACHMENT B-2
EXAMPLE SURFACE WATER SAMPLING LOG SHEET

SURFACE WATER SAMPLING LOG SHEET

Page ___ of ___

Project Site Name: ______________ Sample ID No.: ______________

Project No.: ______________ Sample Location: ______________

☐ Spring ☐ Pond

☐ Stream ☐ Lake

☐ Other ______________

Sampled By: ______________

☐ QA Sample Type: ______________ C.O.C. No.: ______________

Sample Data							
Date and Time			Method			Depth	
pH	S.C.	Temp. (°C)	Turbidity	Color	TBD	TBD	TBD

Analysis	Preservative	Container Requirements	Collected (✓)

Observations/Notes:

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	

TBD: To Be Determined

ATTACHMENT B-3
EXAMPLE SOIL/SEDIMENT SINGLE SAMPLE LOG SHEET

SOIL/SEDIMENT
SINGLE SAMPLE LOG SHEET

Page ___ of ___

Project Site Name: ______________

Project No.: ______________

- ☐ Surface Soil
- ☐ Subsurface Soil
- ☐ Sediment
- ☐ Other ________
- ☐ QA Sample Type: __________

Sample ID No.: ______________

Sample Location: ______________

Sampled By: ______________

C.O.C. No.: ______________

Sample Method:	Composite Sample Data		
	Sample	Time	Color/Description
Depth Sampled:			
Sample Date and Time:			

Type of Sample

- ☐ Grab
- ☐ Composite
- ☐ Grab-Composite
- ☐ High Concentration
- ☐ Low Concentration

Sample Description	
Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)

Analysis	Container Requirements	Collected (X)

Map:

Observations/Notes:

Circle if Applicable:	
MS/MSD	Duplicate ID No:

Signature(s):

ATTACHMENT B-4
CONTAINER SAMPLE LOG SHEET FORM

Brown & Root Environmental

Page ___ of _

☐ Container Data

Case #: ______

By: ______________________

Project Site Name: ______________________ Project Site No. ______________________

Brown & Root Env. Source No. ______________ Source Location: ______________________

Container Source	Container Description
☐ Drum ☐ Bung Top ☐ Lever Lock ☐ Bolted Ring ☐ Other ________ ☐ Bag/Sack ☐ Tank ☐ Other ________	Color: ________ Condition: ________ Markings: ________ Vol. of Contents: ________ Other: ________

Disposition of Sample	Sample Description			
☐ Container Sampled ☐ Container opened but not sampled. Reason: ________ ☐ Container not opened. Reason: ________		Layer 1	Layer 2	Layer 3
	Phase	☐Sol. ☐Liq.	☐Sol. ☐Liq.	☐Sol. ☐Liq.
	Color	________	________	________
	Viscosity	☐L ☐M ☐H	☐L ☐M ☐H	☐L ☐M ☐H
	% of Total Volume	________	________	________
	Other ________	________	________	________

Monitor Reading:	Type of Sample ☐ Low Concentration ☐ High Concentration ☐ Grab ☐ Composite ☐ Grab-composite		
Sample Method:			
Sample Date & Time:	Sample Identification	Organic	Inorganic
Sampled by:			
Signature(s):	Date Shipped		
Analysis:	Time Shipped		
	Lab		
	Volume		

ATTACHMENT B-5

SAMPLE LABEL

Brown & Root Environmental PROJECT: ____________

STATION LOCATION: ____________

DATE: ___/___/___ TIME: ________ hrs.

MEDIA: WATER ☐ SOIL ☐ SEDIMENT ☐ ________ ☐

CONCENTRATION: LOW ☐ MEDIUM ☐ HIGH ☐

TYPE: GRAB ☐ COMPOSITE ☐

ANALYSIS		PRESERVATION	
VOA ☐	BNAs ☐	Cool to 4°C	☐
PCBs ☐	PESTICIDES ☐	HNO_3 to pH < 2	☐
METALS: TOTAL ☐	DISSOLVED ☐	NaOH to pH > 12	☐
CYANIDE ☐		____________	☐
____________ ☐			

Sampled by: ____________

Remarks:

ATTACHMENT B-6

CHAIN-OF-CUSTODY RECORD FORM
(Original is 8.5 x 11")

PROJECT NO.	PROJECT NAME					NO. OF CONTAINERS							REMARKS
SAMPLERS: *(Signature)*													
STA NO.	DATE	TIME			STATION LOCATION								

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks:	

ATTACHMENT B-7

CHAIN-OF-CUSTODY SEAL

Signature

Date

CUSTODY SEAL

CUSTODY SEAL

Date

Signature

ATTACHMENT C-1
EXAMPLE GROUNDWATER LEVEL MEASUREMENT SHEET

GROUNDWATER LEVEL MEASUREMENT SHEET

Page ___ of ___

PROJECT NAME: ____________________ LOCATION: ____________________
PROJECT NUMBER: ____________________ MEASURING DEVICE: ____________________
PERSONNEL: ____________________ ADJUSTMENT FACTOR: ____________________
DATE: ____________________ REMARKS: ____________________
WEATHER CONDITIONS: ____________________

Well or Piezometer Number	Time	Elevation of Reference Point (Feet)*	Water Level Indicator Reading (Feet)*	Groundwater Elevation (Feet)*	Comments

*Measurements to nearest 0.01 foot.

Signature(s): ____________________

ATTACHMENT C-2
EXAMPLE PUMPING TEST DATA SHEET

PUMPING TEST DATA SHEET

Page ___ of ___

PROJECT NAME: ____________________
PROJECT NUMBER: ____________________
PUMPING TEST: [ ]
TEST NUMBER: ____________________
METHOD OF MEASUREMENT: ____________________
DATE(s): ____________________
STATIC H_2O LEVEL (ft) (SO) ____________________

PUMPING WELL NUMBER: ____________________
MEASURED WELL NUMBER: ____________________
STEP DRAW DOWN TEST [ ]
MONITORING POINT: ____________________
DEPTH CORRECTION (ft) ____________________
PUMP SETTING (Ft. below monitoring point): ________
DISTANCE FROM PUMPING WELL (ft) (r): ________

PUMPING TEST PERFORMED BY: ____________________
REMARKS: ____________________

MILITARY TIME	ELAPSED TIME SINCE PUMP START OR STOP (Min.)	WATER LEVEL (Ft.)	CORRECTION (Ft.)	DRAW DOWN OR RECOVERY (Ft.)	FLOW METER READING (Gals.)	PUMPING RATE (GPM)	REMARKS

SIGNATURE(s): ____________________

ATTACHMENT C-3

PACKER TEST REPORT FORM

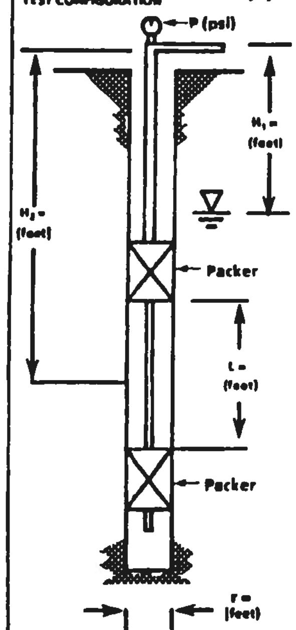
PROJECT: ______________ PROJECT NO.: ______________ TEST NO: ______________ PAGE ____ OF ____

BORING NO.: ______________ CASING DEPTH: ______________ CONTRACTOR: ______________ STATIC WATER LEVEL ______________

TEST INTERVAL: ______________ BY: ______________ CHECKED: ______________ PACKER PRESSURE ______________

Flow Test					Calculated Results							
Pressure, p (psi)	Elapsed Time (min)	Flow Reading	Δ Flow, ΔQ (ft³)	Δ Flow, ΔQ (gal)	Flow Rate Q (gal/min)	H_1* (ft)	Hp(Ft) = 2.31·(psi)	H_2* (ft)	H = Hp + (H1 or H2)	Cp	K (ft/yr) = Cp·Q/H	K (cm/sec) = 9.67 x 10⁻⁷· K (ft/yr)

TEST CONFIGURATION



Length of Test Section in feet, l	Cp Drilling Bit Size EX (1.5")	AX (1.875")	BX (2.375")	NX (3")
1	31,000	28,500	25,800	23,300
2	19,400	18,100	16,800	15,500
5	9,800	9,300	8,800	8,400
8	6,800	6,500	6,100	5,800
10	5,700	5,400	5,200	4,900
15	4,100	3,900	3,700	3,600
20	3,200	3,100	3,000	2,900

CP = (1/(2 π L)) ln(L/r) (70,315 S)
7.48 Gallons = 1 Ft³
1 psi = 2.31 ft head
Remarks: ______________________________

* H_1 is used when the test length is below the water table.
H_2 is used when the test length is above the water table.

ATTACHMENT C-4
EXAMPLE BORING LOG

BORING LOG

Page___ of___

PROJECT NAME: ____________________________
PROJECT NUMBER: ____________________________
DRILLING COMPANY: ____________________________
WATER LEVEL DATA: ____________________________

BORING NUMBER: ____________________________
DATE : ____________________________
GEOLOGIST: ____________________________

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows/6" or RQD (%)	Sample Recovery/Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION			*USCS	Remarks	PID or FID Reading (ppm)
					Soil Density/Consistency or Rock Hardness	Color	Material Classification			

*When rock coring enter rock brokeness.

CONVERTED TO WELL : ___ Yes ___ No; WELL I.D.#: ____________________________
REMARKS: ____________________________

Signature(s): ____________________________

LEGEND

SOIL TERMS

UNIFIED SOIL CLASSIFICATION (USCS)

COARSE-GRAINED SOILS
More Than Half of Material is LARGER Than No. 200 Sieve Size

FIELD IDENTIFICATION PROCEDURES (Excluding Particles Larger Than 3 Inches and Basing Fractions on Estimated Weights)			GROUP SYMBOL	TYPICAL NAMES
GRAVELS (50%(+)>1/4"Ø)	CLEAN GRAVELS (Low % Fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
		Predominantly one size or a range of sizes with some intermediate sizes missing.	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines.
	GRAVELS W/FINES (High % Fines)	Non-plastic fines (for identification procedures, see ML)	GM	Silty gravels, poorly graded gravel-sand-silt mixtures.
		Plastic fines (for identification procedures, see CL)	GC	Clayey gravels, poorly graded gravel-sand-clay mixtures.
SANDS 50%(+)<1/4"Ø	CLEAN SANDS (Low % Fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.	SW	Well graded sand, gravelly sands, little or no fines.
		Predominantly one size or a range of sizes with some intermediate sizes missing.	SP	Poorly graded sands, gravelly sands, little or no fines.
	SANDS W/FINES (High % Fines)	Non-plastic fines (for identification procedures, see MCL)	SM	Silty sands, poorly graded sand-silt mixtures.
		Plastic fines (for identification procedures, see CL)	SC	Clayey sands, poorly graded sand-clay mixtures.

FINE-GRAINED SOILS
More Than Half of Material is SMALLER Than No. 200 Sieve Size

FIELD IDENTIFICATION PROCEDURES (Excluding Particles Larger Than 3 Inches and Basing Fractions on Estimated Weights) — Identification Procedures on Fraction Smaller than No. 40 Sieve Size	DRY STRENGTH (Crushing Characteristics)	DILATANCY (Reaction to Shaking)	TOUGHNESS (Consistency Near Plastic Limit)	GROUP SYMBOL	TYPICAL NAMES
SILTS AND CLAYS Liquid Limit <50	None to Slight	Quick to Slow	None	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity.
	Medium to High	None to Very Slow	Medium	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
	Slight to Medium	Slow	Slight	OL	Organic silts and organic silt-clays of low plasticity.
SILTS AND CLAYS Liquid Limit >50	Slight to Medium	Slow to None	Slight to Medium	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
	High to Very High	None	High	CH	Inorganic clays of high plasticity, fat clays.
	Medium to High	None to Very Slow	Slight to Medium	OH	Organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS	Readily identified by color, odor, spongy feel and frequently by fibrous texture.			Pt	Peat and other organic soils

Boundary classifications: Soils possessing characteristics of two groups are designated by combining group symbols. For example, GW-GC, well graded gravel-sand mixture with clay binder.
All sieve sizes on this chart are U.S. Standard.

DENSITY OF GRANULAR SOILS

DESIGNATION	STANDARD PENETRATION RESISTANCE-BLOWS/FOOT
Very Loose	0-4
Loose	5-10
Medium Loose	11-30
Dense	31-50
Very Dense	Over 50

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNC COMPRESSIVE STRENGTH (TONS/SQ. FT.)	STANDARD PENETRATION RESISTANCE-BLOWS/FOOT	FIELD IDENTIFICATION METHODS
Very Soft	Less than 0.25	0 to 2	Easily pentrated several inches by fist
Soft	0.25 to 0.50	2 to 4	Easily penetrated several inches by thumb.
Medium Stiff	0.50 to 1.0	4 to 8	Can be penetrated several inches by thumb.
Stiff	1.0 to 2.0	8 to 15	Readily indented by thumb.
Very Stiff	2.0 to 4.0	15 to 30	Readily indented by thumbnail.
Hard	More than 4.0	Over 30	Indented with difficulty by thumbnail.

ROCK TERMS

ROCK HARDNESS (FROM CORE SAMPLES)

Descriptive Terms	Screwdriver or Knife Effects	Hammer Effects
Soft	Easily Gouged	Crushes when pressed with hammer
Medium Soft	Can be Gouged	Breaks (one blow); crumbly edges
Medium Hard	Can be scratched	Breaks (one blow); sharp edges
Hard	Cannot be scratched	Breaks conchoidally (several blows); sharp edges

ROCK BROKENESS

Descriptive Terms	Abbreviation	Spacing
Very Broken	(V. Br.)	0-2"
Broken	(Br.)	2"-1'
Blocky	(Bl.)	1'-3'
Massive	(M.)	3'-10'

LEGEND:

SOIL SAMPLES - TYPES
S-2" Split-Barrel Sample
ST-3" O.D. Undisturbed Sample
O - Other Samples, Specify in Remarks

ROCK SAMPLES - TYPES
X-NX (Conventional) Core (-2-1/8" O.D.)
Q-NQ (Wireline) Core (-1-7/8" O.D.)
Z - Other Core Sizes, Specify in Remarks

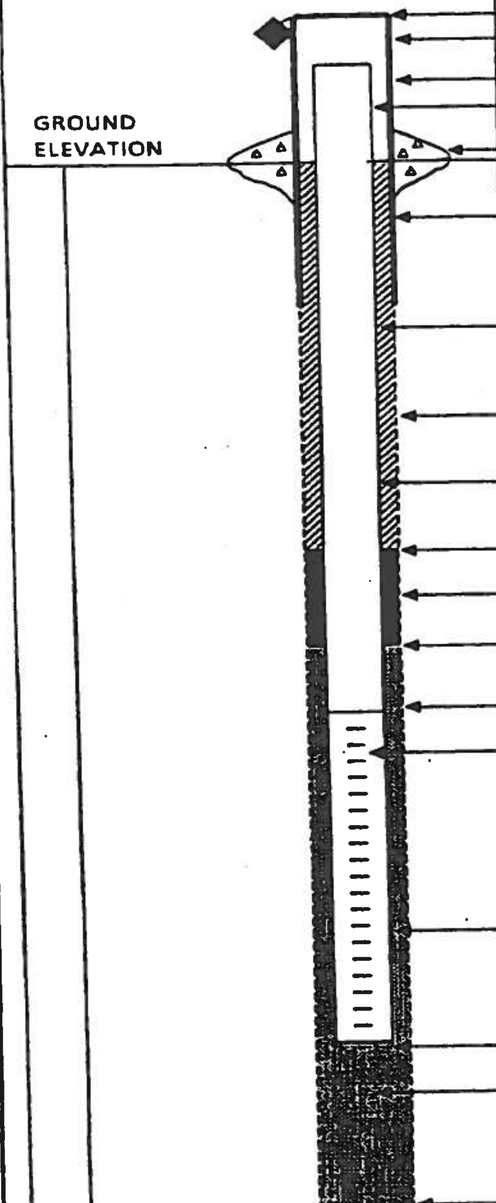
WATER LEVELS
12/18 ▽ 12.6' Initial Level w/Date & Depth
12/18 ▽ 12.6' Stabilized Level w/Date & Depth

ATTACHMENT C-5
EXAMPLE OVERBURDEN MONITORING WELL SHEET

BORING NO.: ____________

OVERBURDEN
MONITORING WELL SHEET

PROJECT ____________ LOCATION ____________ DRILLER ____________
PROJECT NO. ____________ BORING ____________ DRILLING METHOD ____________
ELEVATION ____________ DATE ____________ DEVELOPMENT METHOD ____________
FIELD GEOLOGIST ____________



ELEVATION OF TOP OF SURFACE CASING : ____________
ELEVATION OF TOP OF RISER PIPE: ____________
STICK - UP TOP OF SURFACE CASING: ____________
STICK - UP RISER PIPE : ____________
TYPE OF SURFACE SEAL: ____________
I.D. OF SURFACE CASING: ____________
TYPE OF SURFACE CASING: ____________
RISER PIPE I.D. ____________
TYPE OF RISER PIPE: ____________
BOREHOLE DIAMETER: ____________
TYPE OF BACKFILL: ____________
ELEVATION / DEPTH TOP OF SEAL: ______ / ______
TYPE OF SEAL: ____________
DEPTH TOP OF SAND PACK: ____________
ELEVATION / DEPTH TOP OF SCREEN: ______ / ______
TYPE OF SCREEN: ____________
SLOT SIZE x LENGTH: ____________
I.D. OF SCREEN: ____________
TYPE OF SAND PACK: ____________
ELEVATION / DEPTH BOTTOM OF SCREEN: ______ / ______
ELEVATION / DEPTH BOTTOM OF SAND PACK: ______ / ______
TYPE OF BACKFILL BELOW OBSERVATION WELL: ____________
ELEVATION / DEPTH OF HOLE: ______ / ______

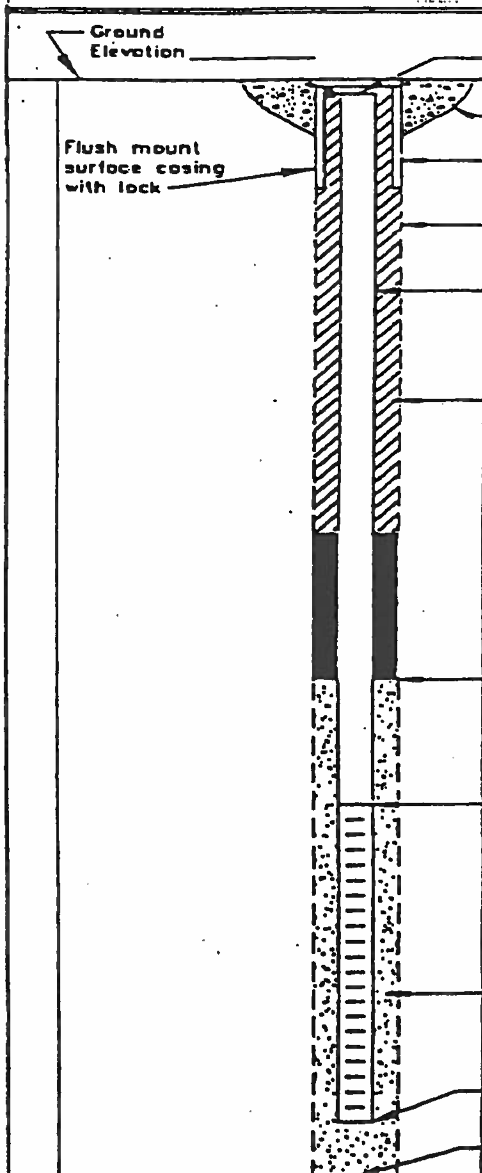
ATTACHMENT C-5A
EXAMPLE OVERBURDEN MONITORING WELL SHEET (FLUSHMOUNT)

BORING NO.: ______

MONITORING WELL SHEET

PROJECT ______ LOCATION ______
PROJECT NO. ______ BORING ______
ELEVATION ______ DATE ______
FIELD GEOLOGIST ______

DRILLER ______
DRILLING METHOD ______
DEVELOPMENT METHOD ______



ELEVATION TOP OF RISER: ______

TYPE OF SURFACE SEAL: ______

TYPE OF PROTECTIVE CASING: ______
I.D. OF PROTECTIVE CASING: ______

DIAMETER OF HOLE: ______

TYPE OF RISER PIPE: ______
RISER PIPE I.D.: ______

TYPE OF BACKFILL/SEAL: ______
______

DEPTH/ELEVATION TOP OF SAND: ______/______

DEPTH/ELEVATION TOP OF SCREEN: ______/______
TYPE OF SCREEN: ______
SLOT SIZE x LENGTH: ______

TYPE OF SAND PACK: ______

DIAMETER OF HOLE IN BEDROCK: ______

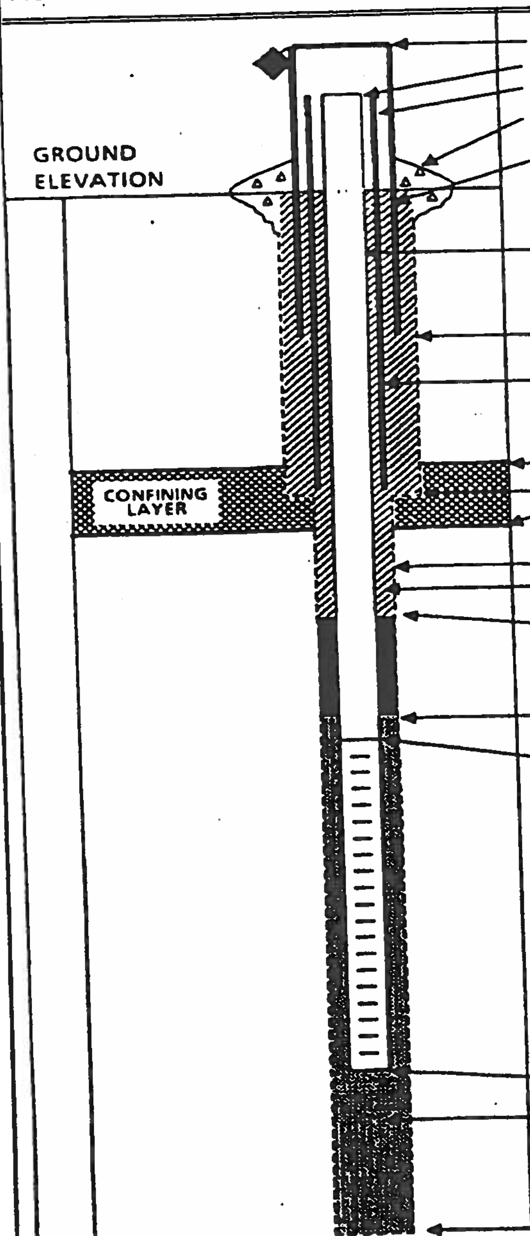
DEPTH/ELEVATION BOTTOM OF SCREEN: ______/______
DEPTH/ELEVATION BOTTOM OF SAND: ______/______
DEPTH/ELEVATION BOTTOM OF HOLE: ______/______
BACKFILL MATERIAL BELOW SAND: ______

ATTACHMENT C-6
EXAMPLE CONFINING LAYER MONITORING WELL SHEET

BORING NO.: ________

CONFINING LAYER
MONITORING WELL SHEET

PROJECT ________ LOCATION ________ DRILLER ________
PROJECT NO. ________ BORING ________ DRILLING METHOD ________
ELEVATION ________ DATE ________ DEVELOPMENT METHOD ________
FIELD GEOLOGIST ________



ELEVATION OF TOP OF SURFACE CASING : ________
ELEVATION OF TOP OF RISER PIPE: ________
ELEVATION TOP OF PERM. CASING: ________
TYPE OF SURFACE SEAL: ________

I.D. OF SURFACE CASING: ________
TYPE OF SURFACE CASING: ________

RISER PIPE I.D. ________
TYPE OF RISER PIPE: ________

BOREHOLE DIAMETER: ________

PERM. CASING I.D. ________
TYPE OF CASING & BACKFILL: ________

ELEVATION / DEPTH TOP CONFINING LAYER: ________
ELEVATION / DEPTH BOTTOM OF CASING: ________
ELEVATION / DEPTH BOT. CONFINING LAYER: ________

BOREHOLE DIA. BELOW CASING: ________
TYPE OF BACKFILL: ________

ELEVATION / DEPTH TOP OF SEAL: ________
TYPE OF SEAL: ________

DEPTH TOP OF SAND PACK: ________

ELEVATION/DEPTH TOP OF SCREEN: ________
TYPE OF SCREEN: ________

TYPE OF SAND PACK: ________

ELEVATION / DEPTH BOTTOM OF SCREEN: ________

ELEVATION / DEPTH BOTTOM OF SAND PACK: ________
TYPE OF BACKFILL BELOW OBSERVATION WELL: ________

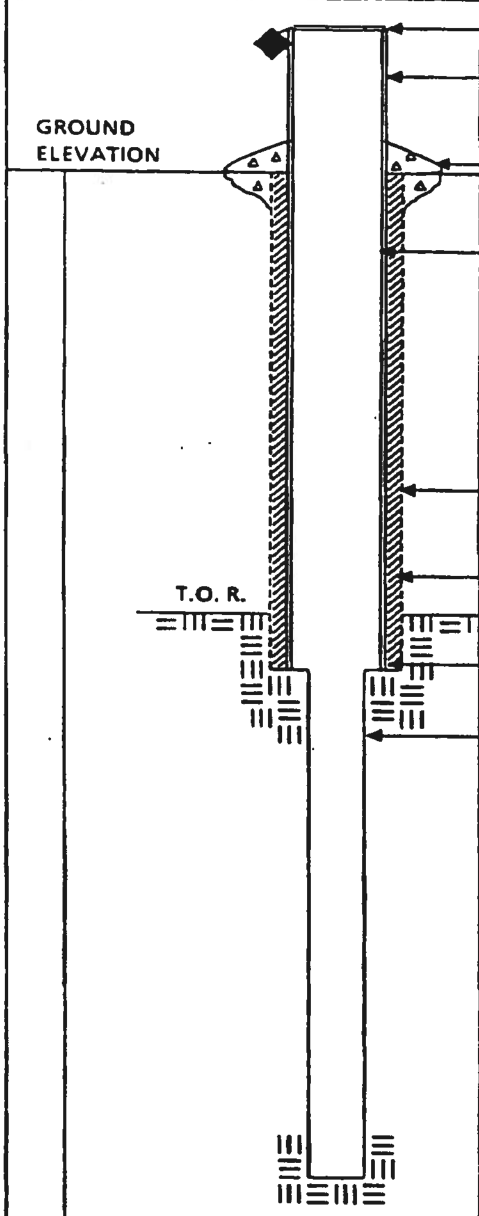
ELEVATION / DEPTH OF HOLE: ________

ATTACHMENT C-7
EXAMPLE BEDROCK MONITORING WELL SHEET - OPEN HOLE WELL

BORING NO.: ____________

BEDROCK
MONITORING WELL SHEET
OPEN HOLE WELL

PROJECT ____________ LOCATION ____________ DRILLER ____________
PROJECT NO. ____________ BORING ____________ DRILLING
ELEVATION ____________ DATE ____________ METHOD ____________
FIELD GEOLOGIST ____________ DEVELOPMENT
METHOD ____________



ELEVATION OF TOP OF CASING: ____________

STICK UP OF CASING ABOVE GROUND SURFACE: ____________

TYPE OF SURFACE SEAL: ____________
____

I.D. OF CASING: ____________
TYPE OF CASING: ____________

TEMP. / PERM.: ____________

DIAMETER OF HOLE: ____________

TYPE OF CASING SEAL: ____________

DEPTH TO TOP OF ROCK: ____________

DEPTH TO BOTTOM CASING: ____________

DIAMETER OF HOLE IN BEDROCK: ____________

DESCRIBE IF CORE / REAMED WITH BIT:
____
____
____

DESCRIBE JOINTS IN BEDROCK AND DEPTH:
____
____
____

ELEVATION / DEPTH OF HOLE: ______/______

ATTACHMENT C-8
EXAMPLE BEDROCK MONITORING WELL SHEET - WELL INSTALLED IN BEDROCK

BORING NO.: ______________

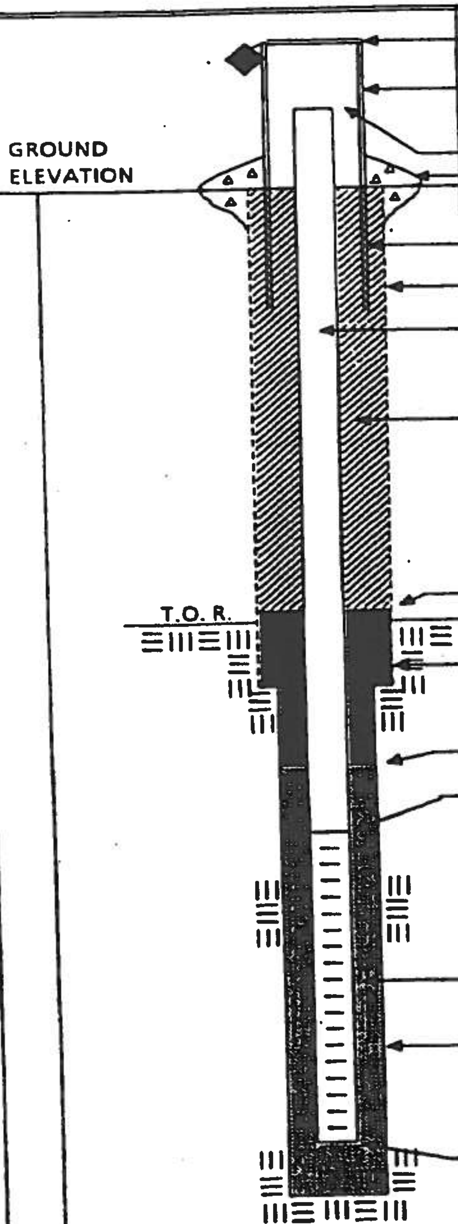
BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT ______________ LOCATION ______________ DRILLER ______________

PROJECT NO. ______________ BORING ______________ DRILLING METHOD ______________

ELEVATION ______________ DATE ______________ DEVELOPMENT METHOD ______________

FIELD GEOLOGIST ______________



ELEVATION OF TOP OF SURFACE CASING: ______________

STICK UP OF CASING ABOVE GROUND SURFACE: ______________

ELEVATION TOP OF RISER: ______________

TYPE OF SURFACE SEAL: ______________

I.D. OF SURFACE CASING: ______________

DIAMETER OF HOLE: ______________

RISER PIPE I.D.: ______________

TYPE OF RISER PIPE: ______________

TYPE OF BACKFILL: ______________

ELEVATION / DEPTH TOP OF SEAL: ______ / ______

ELEVATION / DEPTH TOP OF BEDROCK: ______ / ______

TYPE OF SEAL: ______________

ELEVATION / DEPTH TOP OF SAND: ______ / ______

ELEVATION / DEPTH TOP OF SCREEN: ______ / ______

TYPE OF SCREEN: ______________

SLOT SIZE x LENGTH: ______________

I.D. SCREEN: ______________

TYPE OF SAND PACK: ______________

DIAMETER OF HOLE IN BEDROCK:

CORE / REAM: ______________

ELEVATION / DEPTH BOTTOM SCREEN: ______ / ______

ELEVATION / DEPTH BOTTOM OF HOLE: ______ / ______

ATTACHMENT C-8A
EXAMPLE BEDROCK MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK (FLUSHMOUNT)

BORING NO.: ______

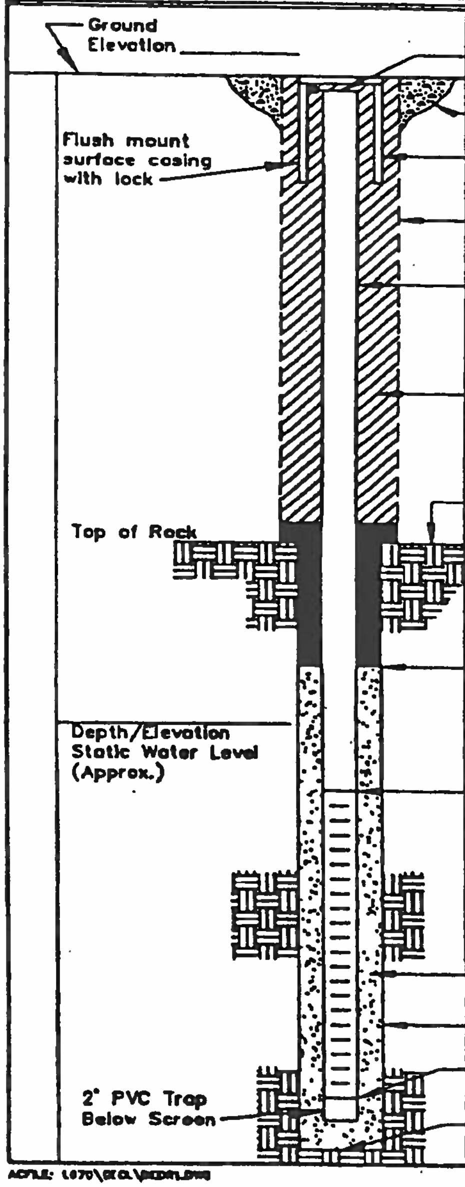
BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT: ______ LOCATION: ______ DRILLER: ______

PROJECT NO.: ______ BORING: ______ DRILLING METHOD: ______

ELEVATION: ______ DATE: ______ DEVELOPMENT METHOD: ______

FIELD GEOLOGIST: ______



ELEVATION TOP OF RISER: ______

TYPE OF SURFACE SEAL: ______

TYPE OF PROTECTIVE CASING: ______

I.D. OF PROTECTIVE CASING: ______

DIAMETER OF HOLE: ______

TYPE OF RISER PIPE: ______

RISER PIPE I.D.: ______

TYPE OF BACKFILL/SEAL: ______

______

DEPTH/ELEVATION TOP OF BEDROCK: ____/____

DEPTH/ELEVATION TOP OF SAND: ____/____

DEPTH/ELEVATION TOP OF SCREEN: ____/____

TYPE OF SCREEN: ______

SLOT SIZE x LENGTH: ______

TYPE OF SAND PACK: ______

DIAMETER OF HOLE IN BEDROCK: ______

DEPTH/ELEVATION BOTTOM OF SCREEN: ____/____

DEPTH/ELEVATION BOTTOM OF SAND: ____/____

DEPTH/ELEVATION BOTTOM OF HOLE: ____/____

BACKFILL MATERIAL BELOW SAND: ______

ATTACHMENT C-9
EXAMPLE TEST PIT LOG

TEST PIT LOG — **Brown & Root Environmental**

PROJECT: ____________________ TEST PIT NO.:

PROJECT NO ____________ DATE: ____________

LOCATION: ____________________

FIELD GEOLOGIST: ____________________

DEPTH (ft.)	LITHOLOGY CHANGE (Depth,ft.)	MATERIAL DESCRIPTION (Soil Density / Consistency, Color)	USCS	REMARKS

Test Pit Cross Section and / or Plan View

REMARKS ____________________

PHOTO LOG ____________________ TEST PIT ________

PAGE ____ OF ____

ATTACHMENT D
EXAMPLE EQUIPMENT CALIBRATION LOG

Brown & Root Environmental

EQUIPMENT CALIBRATION LOG

INSTRUMENT NAME / MODEL : ____________ JOB NAME : ____________

MANUFACTURER : ____________ JOB NUMBER : ____________

CALIBRATION DATE	INITIAL SETTINGS	STANDARDS USED	PROCEDURE	ADJUSTMENTS MADE	FINAL SETTINGS	SIGNATURE	COMMENTS

ATTACHMENT E
EXAMPLE DAILY ACTIVITIES RECORD

Brown & Root Environmental

DAILY ACTIVITIES RECORD

PROJECT ____________ LOCATION ____________
CLIENT ____________ ARRIVAL TIME ______ JOB NO. ______
DATE ____________ DEPARTURE TIME ______
CONTRACTOR ____________ DRILLER ____________
BORING NO. ____________ HNUS REPRESENTATIVE ____________

ITEM	QUANTITY ESTIMATE	QUANTITY TODAY	PREVIOUS TOTAL QUANTITY	CUMULATIVE QUANTITY TO DATE

COMMENTS: ____________

APPROVED BY:

HNUS FIELD REPRESENTATIVE ____________ DRILLER OR REPRESENTATIVE ____________

ATTACHMENT F
FIELD TRIP SUMMARY REPORT
PAGE 1 OF 2

SUNDAY

Date: ______________________ Personnel: ______________________

Weather: ______________________ Onsite: ______________________

Site Activities: ______________________

MONDAY

Date: ______________________ Personnel: ______________________

Weather: ______________________ Onsite: ______________________

Site Activities: ______________________

TUESDAY

Date: ______________________ Personnel: ______________________

Weather: ______________________ Onsite: ______________________

Site Activities: ______________________

WEDNESDAY

Date: ______________________ Personnel: ______________________

Weather: ______________________ Onsite: ______________________

Site Activities: ______________________

ATTACHMENT F
PAGE 2 OF 2
FIELD TRIP SUMMARY REPORT

THURSDAY

Date: ______________________ Personnel: ______________________

Weather: ______________________ Onsite: ______________________

Site Activities: ______________________

FRIDAY

Date: ______________________ Personnel: ______________________

Weather: ______________________ Onsite: ______________________

Site Activities: ______________________

SATURDAY

Date: ______________________ Personnel: ______________________

Weather: ______________________ Onsite: ______________________

Site Activities: ______________________

APPENDIX E

RELEASE REPORT

5090
Ser N4E2/ 00110

26 AUG 1993

Mr. Ernest Frey
Northeast District
Florida Department of Environmental Protection
7825 Bay Meadows Way, Suite B-200
Jacksonville, FL 32256

Subj: DRY CLEANING FLUID SPILL

Dear Mr. Frey:

On May 4, 1993, while re-locating drums of tetrachloroethylene, a 55-gallon drum was punctured spilling 25-30 gallons of dry cleaning fluid. This spill occurred when the forklift operator was attempting to pick up a pallet of drums in the materials handling area beside Building 191A, Fleet and Industrial Supply Center Jacksonville, Fleet Support Center Mayport. The location of the spill is shown on the enclosed map. Our spill response team acted immediately to contain and remove the spill material from the concrete and spill samples were taken for analysis. Copies of the analysis results are enclosed.

Please respond if there is any further action required by Naval Station Mayport. If you have any questions, please contact Mr. Michael Davenport, of my Environmental Staff, at (904) 270-6730.

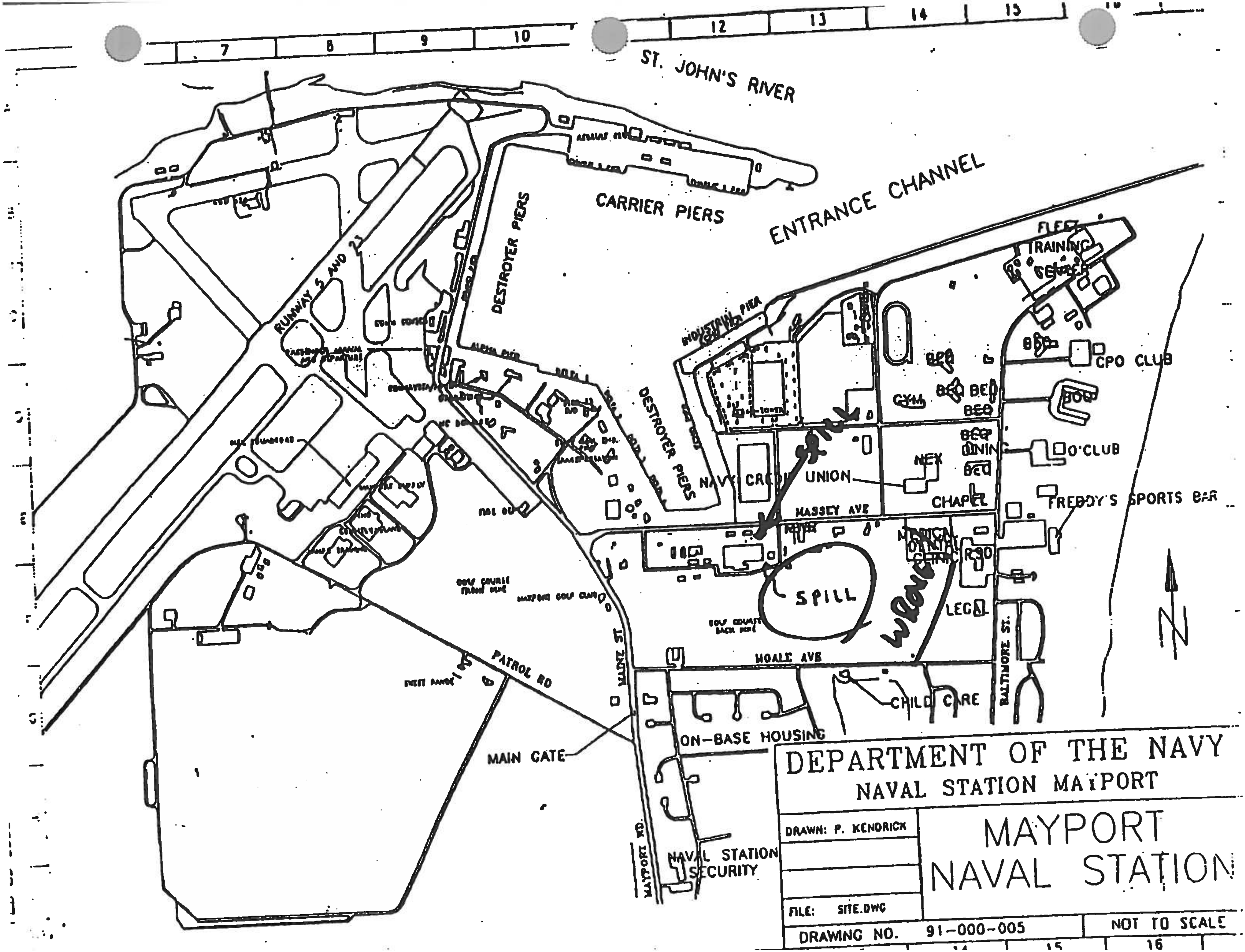
Sincerely,

DOUGLAS P. TOMLINSON
Lieutenant Commander, CEC, U.S. Nav
Staff Civil Engineer
By direction of
the Commanding Officer

Encl:
(1) Site Map
(2) Analysis Results
93-06-188 and 93-06-189

Copy to:
FDEP Tallahassee (Mr. Eric Nuzie)
FDEP Northeast District (Mr. Kenton Brown)
FISC Jacksonville
FISC Jacksonville FSC Mayport
COMNAVAVNACTS Jacksonville (N3)
COMNAVAIRLANT (N442C)
bc: N4E Chron

c:\wpdocs\Spill-TE.FIS/pl/8-11



DEPARTMENT OF THE NAVY
NAVAL STATION MAYPORT

DRAWN: P. KENDRICK	MAYPORT NAVAL STATION
FILE: SITE.DWG	
DRAWING NO. 91-000-005	NOT TO SCALE

FIRST COAST ENVIRONMENTAL LABORATORY INC

July 21, 1993

Client	Navy Public Work	Lab #:	9307-106-1
Sample I.D.:	93-06-188	Date Received:	7-15-93
Sample Matrix:	Solid	Date Completed:	7-19-93
		Date Extraction:	7-16-93

Volatile Organic Compounds
Toxicity Characteristic Leaching Procedure SW-846 Method 1311
USEPA Method 8240 - GC/MS (8260)

Parameter	CAS #	Detection Limit(mg/L)	RESULT(mg/L)	Max. Cont. Level(mg/L)
Benzene	71-43-2	0.005	< 0.005	0.5
Carbon tetrachloride	56-23-5	0.005	< 0.005	0.5
Chlorobenzene	108-90-7	0.005	< 0.005	100.0
Chloroform	67-66-3	0.005	< 0.005	6.0
1,4-Dichlorobenzene	106-46-7	0.005	< 0.005	7.5
1,2-Dichloroethane	107-06-2	0.005	< 0.005	0.5
1,1-Dichloroethene	75-35-4	0.005	< 0.005	0.7
Methyl ethyl ketone	78-93-3	0.05	< 0.05	200.0
Tetrachloroethene	127-18-4	0.005	0.558	0.7
Trichloroethene	79-01-6	0.005	< 0.005	0.5
Vinyl chloride	75-01-4	0.005	< 0.005	0.2

SW-846 -- "Test Methods for Evaluating Solid Waste", Third Edition, November, 1986, and Revision 1, December, 1987, and 55 FR (61) 11862 - 11875.

Surrogate Standards Recovery Percentage

	Recovey %	Acceptance Limits
Toluene - d_8	95.8	86 - 110
4-Bromofluorobenzene	106.9	86 - 115
1,2 Dichlorobenzene - d_4	102.4	87 - 112

Respectfully submitted:

Barry C. Byrd Jr., MS
Technical Director

ECB/tb

FIRST COAST ENVIRONMENTAL LABORATORY, INC.

July 23, 1993

Client: Navy Public Works

Sample I.D.: 93-06-188

Sample Matrix: Solid

Lab #: 9307-106-1

Date Received: 7-15-93

Date Completed: 7-22-93

Date Extraction 7-21-93

Analytical Report
TCLP - Contaminant List (Partial) Method 1311
Methods EPA 8250 (8270)

Parameter	Regulatory Level	Results mg/L
Cresols	200.0	ND *
2,4-Dinitrotoluene	0.13	ND *
Hexachlorobenzene	0.13	ND
Hexachlorobutadiene	0.5	ND
Hexachlorethane	3.0	ND
Nitrobenzene	2.0	ND
Pentachlorophenol	100.0	ND *
Pyridine	5.0	ND *
2,4,5-Trichlorophenol	400.0	ND *
2,4,6-Trichlorophenol	2.0	ND *

Note: ND = (None detected, lower detectable limit - 0.010 mg/L)
ND * = (None detected, lower detectable limit - 0.025 mg/L)
J = (Detected but below quantitive limit, quantition suspect)
B = (this compound also detected in the blank)

Respectfully submitted:

Barry C. Byrd, Jr., MS
Technical Director

BCB/tb

FIRST COAST ENVIRONMENTAL LABORATORY, INC.

July 20, 1993

Client:	Navy Public Works (93-06-188)	Lab #:	9307-106-1
Sample I.D.:	MYP1	Date Received:	7-15-93
Sample Matrix:	Water	Date Completed:	7-20-93

Metals Analytical Summary
Toxicity Characteristic Leaching Procedure SW-846 Method 1311

Parameter	SW-846 Method	CAS #	Detection Limit(mg/L)	RESULT(mg/L)	Max. Cont. Level(mg/L)
Arsenic	6010	7440-38-2	0.0394	0.053	5.0
Barium	6010	7440-39-3	0.00454	0.122	100.0
Cadmium	6010	7440-43-9	0.00836	< 0.00836	1.0
Chromium	6010	7440-47-3	0.0140	0.038	5.0
Lead	6010	7439-92-1	0.0600	< 0.060	5.0
Mercury	7470,1	7439-97-6	0.0000917	0.176	0.2
Selenium	6010	7782-49-2	0.0452	0.076	1.0
Silver	6010	7440-22-4	0.00414	0.608	5.0

SW-846 -- "Test Methods for Evaluating Solid Waste", Third Edition, November, 1986, and Revision 1, December, 1987, and 55 FR (61) 11862 - 11875.

Respectfully submitted,

Adolph W. Wollitz
Laboratory Director
FHRS Lab #E82102
FHRS Lab #82110
EPA #FL062
DER Comp QAPP # 870222G

AWW/tb

...ly 21, 1993

[illegible]	[illegible]	Lab #.	[illegible]
Sample I.D.	93-06-[illegible]	Date Received:	7-15-93
Sample Matrix	Solid	Date Completed:	7-20-93
		Date Extraction:	7-19-93

Volatile Organic Compounds
Toxicity Characteristic Leaching Procedure SW-846 Method 1311
USEPA Method 8240 - GC/MS (8260)

Parameter	CAS #	Detection Limit(mg/L)	RESULT(mg/L)	Max. Cont. Level(mg/L)
Benzene	71-43-[illegible]	0.005	< 0.005	0.5
Carbon tetrachloride	56-23-[illegible]	.005	< .005	[illegible]
Chlorobenzene	108-90-[illegible]	0.005	< 0.005	100
Chloroform	67-66-[illegible]	0.005	0.005	6.0
1,4-Dichlorobenzene	106-46-7	0.005	< 0.005	7.5
1,2-Dichloroethane	107-06-[illegible]	0.005	< 0.005	0.5
1,1-Dichloroethene	75-35-4	0.005	< .005	0.7
Methyl ethyl ketone	78-93	.05	< .05	200
Tetrachloroethene	127-18	0.005	0.112	0.7
Trichloroethene	79-01-[illegible]	0.005	< 0.005	0.5
Vinyl chloride	75-01-4	0.005	< 0.005	0.2

SW-846 -- "Test Methods for Evaluating Solid Waste", Third Edition, November, 1986, and Revision 1, December, 1987, and 55 FR (61) 11862 - 11875.

Surrogate Standards Recovery Percentage

	Recovery %	Acceptance Limits
Toluene - d_8	1[illegible]	88 - 110
4-Bromofluorobenzene	10[illegible]	86 - 115
1,2 Dichlorobenzene - d_4	1[illegible]	87 - 112

Respectfully submitted,

Barry C. Byrd, Jr., MS
Technical Director

BCB/tb

FIRST COAST ENVIRONMENTAL [illegible] INC.

Jul. 23, [illegible]

[illegible]	Navy Public Works	[illegible] #:	9307-106-2
[illegible]	93-06-182	Date [illegible]	7-15-93
[illegible]	Solid	Date Completed	7-22-93
		Date [illegible]	7-21-93

Analytical Report
TCLP Contaminant List (Partial) Method 1311
Methods EPA 8250 (8270)

Parameter	Regulatory Level	Results mg/L
Cresol	200.0	ND *
[illegible]	0.13	ND *
Hexachlorobenzene	0.13	ND
Hexachlorobutadiene	0.5	ND
Hexachloroethane	3.0	ND
[illegible]	2.0	ND
[illegible]	100.0	ND *
[illegible]	5.0	ND *
[illegible]	400.0	ND *
[illegible]	2.0	ND *

Note	ND	=	(None detected, lower detectable limit - 0.010 mg/l
	ND *	=	(None detected, lower detectable limit - 0.025 mg/L
	J	=	(Detected but below quantitive limit, quantition suspect)
	B	=	(this compound also detected in the blank)

Respectfully submitted:

Barr[illegible] MS
Technical [illegible]

BCB [illegible]

[illegible]

COAST ENVIRONMENTAL

July 20, 1993

Client: Navy Public Works (93-06-189)

Lab #: 9307-106-2

Sample I.D.: MYPT

Date Received: 7-15-93

Sample Matrix: Water

Date Completed: 7-20-93

Metals Analytical Summary
Toxicity Characteristic Leaching Procedure SW-846 Method 1311

Parameter	SW-846 Method	CAS #	Detection Limit(mg/L)	RESULT(mg/L)	Max. Cont. Level(mg/L)
Arsenic	6010	7440-38-2	0.0394	0.093	5.0
Barium	6010	7440-39-3	0.00454	0.028	100.0
Cadmium	6010	7440-43-9	0.00836	< 0.00838	1.0
Chromium	6010	7440-47-3	0.0180	0.017	5.0
Lead	6010	7439-92-1	0.0600	< 0.050	5.0
Mercury	7470.1	7439-97-6	0.0000517	0.00016	0.2
Selenium	6010	7782-49-2	0.0452	< 0.0452	1.0
Silver	6010	7440-22-4	0.00414	< 0.00414	5.0

SW-846 -- "Test Methods for Evaluating Solid Waste", Third Edition, November, 1986, and Revision 1, December, 1987, and 55 FR (61) 11862 - 11875.

Respectfully submitted,

Adolph W. Wollitz
Laboratory Director
FHRS Lab #E82102
FHRS Lab #87110
EPA #FL062
DER Comp QAPP # 870222G

AWW/25

12 July 93

From: 320.2
To: 240

Subj: ANALYTICAL TESTING

1. Request the following samples be tested for the parameters indicated.

Sample No.	Media	Test (Clin)	COST	Source
93-06-188	Solid, sand	TCLP (full no pesticides)	$.	Mypt
93-06-189	Solid, black top	TCLP (full no pesticides)	$.	Mypt
93-06-190	Liquid	TCLP (full no pesticides)	$.	Jax Bldg 171
		Total	$ .00	

2. All analysis shall conform to Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, EPA Publication SW-846.

3. Job Order number to be used this project is 1243006 and a 24-hour turn around is requested on analytical results.

4. Please contact Gail Fallon or Andy Long at 772-4551 if there are any questions.

Andy Long
ANDY LONG

RC# 00186
To 240 7/13/93
To LAB 7/15/93

FEB-09-1996 11:43

FIRST COAST ENVIRONMENTAL LABORATORY, INC.

July 21, 1993

Lab #: 9307-106

Client: Navy Public Works

Date Received: 7-15-93

Sample I.D.: See Below (HYPT)

Date Completed: 7-20-93

Sample Matrix: See Below

Metals Analytical Summary

FCEL Lab #	Sample I.D. Station	Sample Matrix	Parameter	Method	Results
9307-106-1	93-06-188	Solid	Chromium	6010	7.97 mg/Kg
9307-106-2	93-06-189	Solid	Chromium	6010	5.56 mg/Kg

Respectfully submitted,

Adolph W. Wollitz
Laboratory Director
FHRS Lab #E82102
FHRS Lab #82110
EPA #FL062
DER Comp QAPP # 870222G

AWW/tb

APPENDIX F

DRAFT INVESTIGATIVE DERIVED WASTE MANAGEMENT PLAN

DRAFT

RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION (RFI) WORKPLAN

ADDENDUM 1
INVESTIGATION-DERIVED WASTE MANAGEMENT PLAN

U.S. NAVAL STATION MAYPORT
MAYPORT, FLORIDA

UIC: N60201

Contract No. N62467-89-D-0317

Prepared by:

ABB Environmental Services, Inc.
2590 Executive Center Circle, East
Tallahassee, Florida 32301

Prepared for:

Department of the Navy, Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
Charleston, South Carolina 29411-0068

Jim Reed, Engineer-in-Charge

December 1992

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NAVSTA Mayport Investigation-Derived
Waste Management Plan

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NAVSTA Mayport Investigation-Derived
Waste Management Plan

LIST OF TABLES

NAVSTA Mayport Investigation-Derived
Waste Management Plan

GLOSSARY

CFR	Code of Federal Regulations
IDW	investigation-derived wastes
NAVSTA	naval station
PPE	personal protective equipment
PVC	polyvinyl chloride
RCRA	Resource Conservation And Recovery Act
RFA	Resource Conservation And Recovery Act Facility Assessment
RFI	Resource Conservation And Recovery Act Facility Investigation
SWMU	Solid Waste Management Unit
TCLP	toxicity characteristic leaching procedure
TSD	treatment, storage, and disposal
WWTP	Waste Water Treatment Plant

1.0 MAYPORT INVESTIGATION-DERIVED (IDW) MANAGEMENT PLAN

This plan details the handling of all investigation-derived wastes (IDW) expected to be generated during Phase 2 Resource Conservation and Recovery Act (RCRA) Facility Investigation/RCRA Facility Assessment (RFI/RFA) activities at U.S. Naval Station (NAVSTA) Mayport, Florida. The first section describes the types of IDW expected to be generated and the disposal options available for each. The second section describes the procedures that will be used to determine whether each IDW is an RCRA hazardous or nonhazardous waste. Finally, an IDW management decision tree is presented to follow the IDW from point of generation all the way through to proper disposal.

There are five types of IDW expected to be generated. These include soil cuttings, drilling fluids, decontamination fluids, development and purge groundwater, and disposable sampling equipment such as personal protective equipment (PPE). The following is a description of each type of IDW and their respective disposal options.

1.1 SOIL CUTTINGS. Soil or drill cuttings generated during soil boring investigations and well installation are handled depending on proximity and location of the site.

For remote or isolated sites such as Solid Waste Management Unit (SWMU) 15 (See Figure 1-1), the cuttings will be drummed, labeled, and left onsite while laboratory analyses of the media samples are completed. After identifying the soil as an RCRA hazardous or nonhazardous waste (see Section 2.0), it will be handled appropriately. Nonhazardous soils will be spread out on the ground to prevent a nuisance condition, physical hazard, or drainage problem near the well or boring where they were generated. The cuttings will be placed so that they will not be eroded by surface water and rainfall and create sediment loads to nearby surface waterways such as ditches, curbs, and swales.

For populated sites or heavy traffic areas such as SWMUs 6, 7, 8, 9, 10, 11, and 16 (Figure 1-2), the cuttings will be drummed, labeled, and transported to a

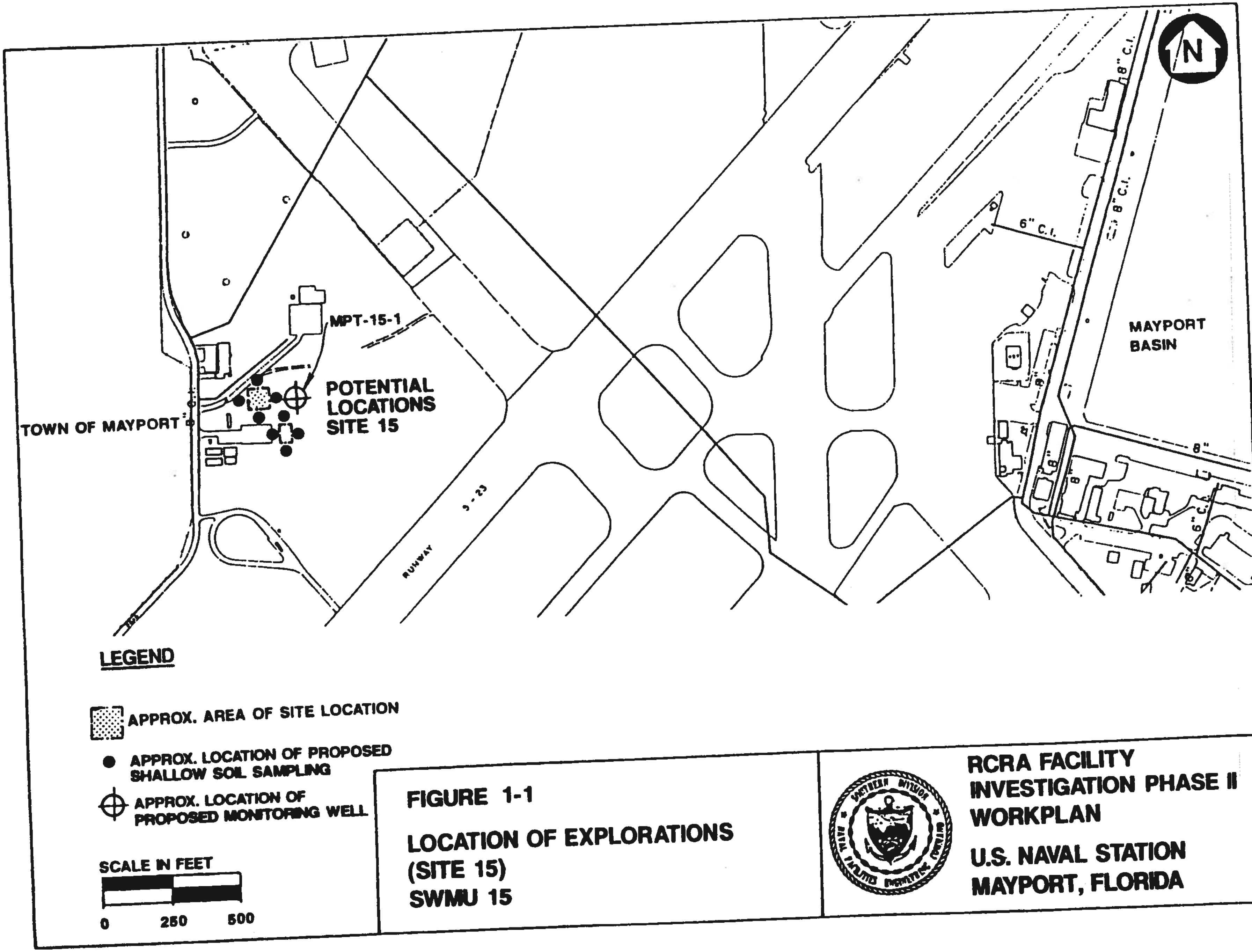

FIGURE 1-1

**LOCATION OF EXPLORATIONS
(SITE 15)
SWMU 15**

**RCRA FACILITY
INVESTIGATION PHASE II
WORKPLAN**

**U.S. NAVAL STATION
MAYPORT, FLORIDA**

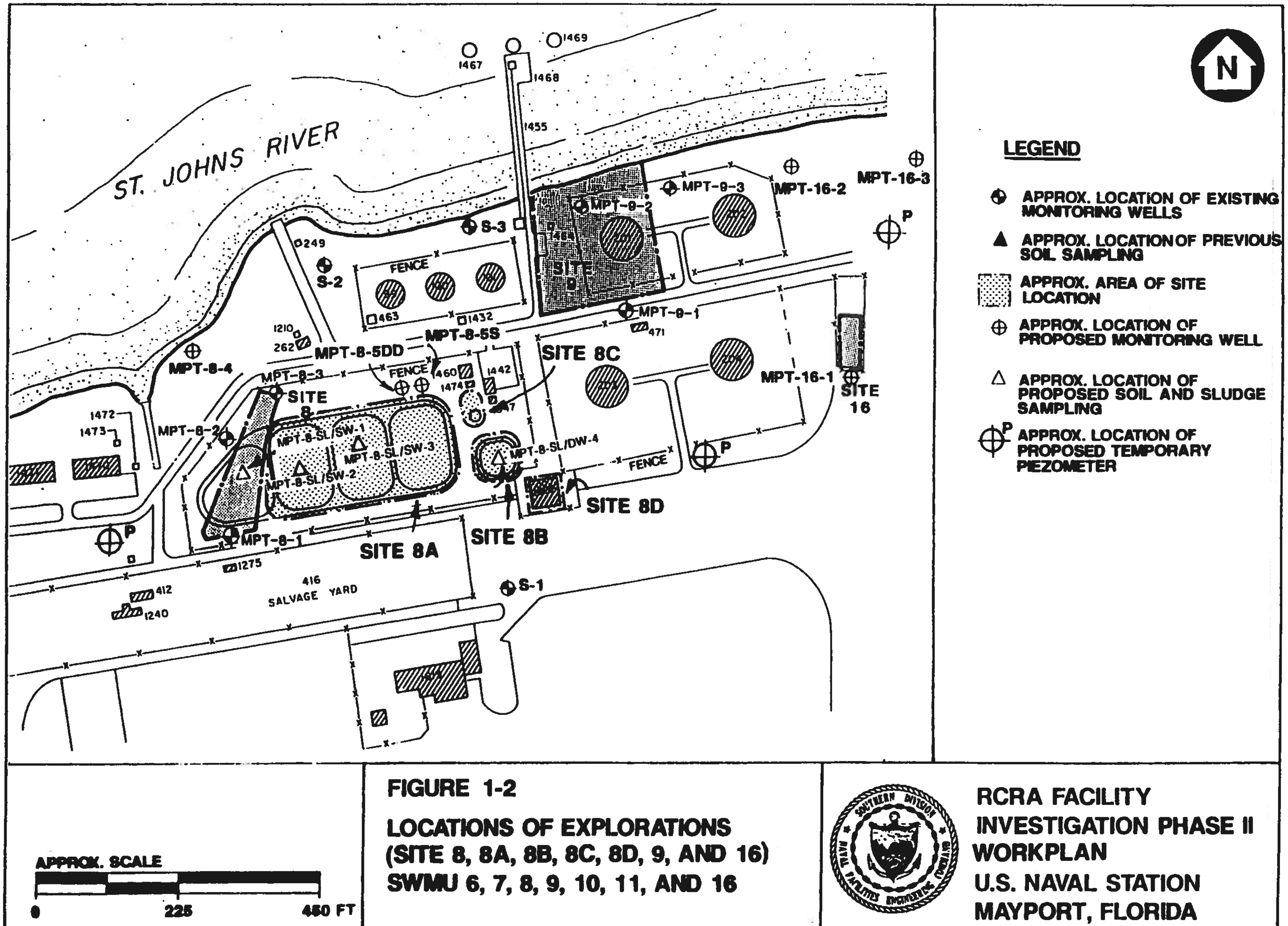

FIGURE 1-2

LOCATIONS OF EXPLORATIONS
(SITE 8, 8A, 8B, 8C, 8D, 9, AND 16)
SWMU 6, 7, 8, 9, 10, 11, AND 16

RCRA FACILITY
INVESTIGATION PHASE II
WORKPLAN
U.S. NAVAL STATION
MAYPORT, FLORIDA

temporary storage facility to be designated by base Navy personnel. The drummed soils will remain in storage until laboratory analyses of the media samples are completed. Drummed, nonhazardous soil cuttings will be transported back to the site from which they were generated and spread out on the ground as for the remote or isolated sites.

Drummed soil cuttings generated at both remote sites and populated areas that have been identified as hazardous will be transported offsite to a hazardous waste facility for proper storage and disposal. Management of hazardous IDW will be the responsibility of the Navy.

The volume of soil cuttings expected to generated during Phase II activities is approximately 29 55-gallon drums.

<u>1.2 DRILLING FLUIDS</u>. Drilling fluids or muds generated during well installation will be drummed and labeled. The drummed fluids at both remote and populated sites will be handled in the same manner as the drummed soil cuttings. After identifying the fluid as an RCRA hazardous or nonhazardous waste, it will be handled appropriately. Nonhazardous fluids will be disposed of in a shallow excavation pit approximately 15 feet square by 3 feet deep which will be constructed at a location to be designated by the base Navy personnel. Ideally, the disposal pit will be constructed as close to the original point of generation as possible. Nonhazardous drilling fluids from all Phase 2 sites will be transported to the excavation pit location by the subcontractor.

Hazardous drilling fluids will be transported offsite to a hazardous waste facility. Management of hazardous IDW will be the responsibility of the Navy.

The approximate volume of drilling fluid expected to be generated is 14 55-gallon drums.

<u>1.3 DECONTAMINATION FLUIDS</u>. Decontamination fluids are generated from two sources. Decontamination fluids generated from steam cleaning of drilling equipment (augers, rod, split-spoons, etc.) and well material (polyvinyl chloride [PVC]) will be collected and drummed at the designated decontamination area or

pad. This fluid will left on-site while laboratory analyses of the media samples is completed. After identifying the fluid as an RCRA hazardous or nonhazardous waste, it will be handled appropriately. Decontamination fluids generated from decontamination of sampling equipment (bowls, spoons, bailers, etc.) will be collected and drummed at the designated decontamination area unless onsite decontamination is required. In this case, decontamination fluids will be collected and transported to the decontamination area where they will be drummed.

All decontamination fluids generated from sampling equipment will be treated as waste water and will be discharged to the base Waste Water Treatment Plant (WWTP) via the sanitary sewer system.

The approximate volume of decontamination fluid expected to be generated is 10 55-gallon drums.

1.4 DEVELOPMENT AND PURGE GROUNDWATER. Well water generated from well development and well purging will be drummed and labeled. The drummed well water at both remote and populated sites will be handled in the same manner as the drummed soil cuttings. After identifying the well water as an RCRA hazardous or nonhazardous waste it will be handled appropriately. Nonhazardous well water will be disposed of as near as possible to the well location from which it was generated. This will be accomplished by pouring the well water on the ground and allowing the water to percolate into the soil. Care will be taken to assure that the well water does not flow into surface waterways such as ditches, curbs, or swales.

Hazardous well water will be transported to the base Hazardous Waste storage facility in coordination with the base Navy personnel for proper storage and disposal. Management of hazardous IDW will be the responsibility of the Navy.

The approximate volume of well development and purge water expected to be generated is 17 55-gallon drums.

1.5 DISPOSABLE SAMPLING EQUIPMENT (PERSONAL PROTECTION EQUIPMENT [PPE]). Miscellaneous used sampling equipment such as gloves, tyvek overalls, booties and other PPE will be placed in drums onsite. Drummed disposable sampling equipment at both remote and populated sites will be handled in the same manner as the drummed soil cuttings. When it is determined whether or not these items are likely to be contaminated with an RCRA hazardous waste, they will be handled appropriately. If these items are not likely to be contaminated, they will be disposed as non-contaminated solid waste. The materials will be collected and placed in double heavy duty polyethylene bags (e.g., "hefty trash bags") and disposed of in a base dumpster used for nonhazardous industrial waste. The dumpster will be designated by base Navy personnel.

Disposable sampling equipment likely to be contaminated with an RCRA hazardous waste will be drummed and transported offsite for proper storage and disposal. Management of hazardous IDW will be the responsibility of the Navy.

2.0 DETERMINATION OF RCRA HAZARDOUS OR NONHAZARDOUS IDW

The following procedure will be used for each type of IDW previously described. This will allow waste to be easily identified as an RCRA hazardous or nonhazardous waste and handled appropriately.

All IDW generated onsite will be characterized, drummed, and labeled at the point of generation. All IDW will remain drummed until chemical analysis results of the media samples have been received. While the results are pending, proper storage of the IDW will be determined depending on site location (See section 1.0). After receiving laboratory results for the media samples, the respective IDW will be identified as an RCRA hazardous or nonhazardous waste using the following criteria.

Media samples will be analyzed, by an approved laboratory, for RCRA hazardous waste characteristics in accordance with 40 Code of Federal Regulations (CFR), Part 261. The four characteristics are ignitability, corrosivity, reactivity, and toxicity. For expected Phase II IDW, there is adequate knowledge, based on information from previous investigations, that toxicity is the only characteristic of concern. Thus, toxicity analysis will be the basis for the determination of hazardous and nonhazardous wastes unless site-specific observations indicate otherwise.

<u>For soils</u>. If the media sample is shown to have greater than 20 times the regulatory threshold level for toxicity of any regulated compound (see "*Management of Investigation-Derived Wastes During Site Inspections*" EPA/540/G-91/009), a sample of the corresponding, drummed IDW will be analyzed for toxicity characteristic leaching procedure (TCLP) toxicity to determine the extract concentration. If the IDW extract contains a regulated compound above its threshold level, the soil is identified as an RCRA hazardous waste and must be disposed of offsite. If the media sample is less than 20 times all regulated levels or if the IDW TCLP sample concentration is below all regulated levels, the IDW is an RCRA nonhazardous waste and will be disposed of onsite at the point of generation.

For water. If the media sample is shown to have greater than the regulatory threshold level for toxicity of any regulated compound, the corresponding IDW is identified as an RCRA hazardous waste and must be disposed of offsite. If the media sample is below all regulated levels, the IDW is an RCRA nonhazardous waste and will be disposed of onsite at the point of generation.

The following step-by-step procedures and corresponding decision tree presented in Figure 2-1 takes the IDW from generation through disposal and should be used as a quick reference guide.

1. Characterize generated IDW

   - soil cuttings
   - drilling fluids
   - decontamination fluids
   - development and purge groundwater
   - disposable sampling equipment

2. Drum IDW as it is generated and fill out drum tracking log (Attachment A).

3. Determine where IDW should be stored while waiting for laboratory analysis of media samples.

   - if site is in remote location, store onsite
   - if site is in populated area, store offsite (at base storage facility)

4. After receiving laboratory analysis results for media samples, identify IDW as an RCRA hazardous or nonhazardous waste using the following criteria.

For soils. If laboratory results are less than 20 times the regulatory threshold level for any regulated compound, the soil is an RCRA nonhazardous waste. If laboratory results of media samples show greater than 20 times the regulatory

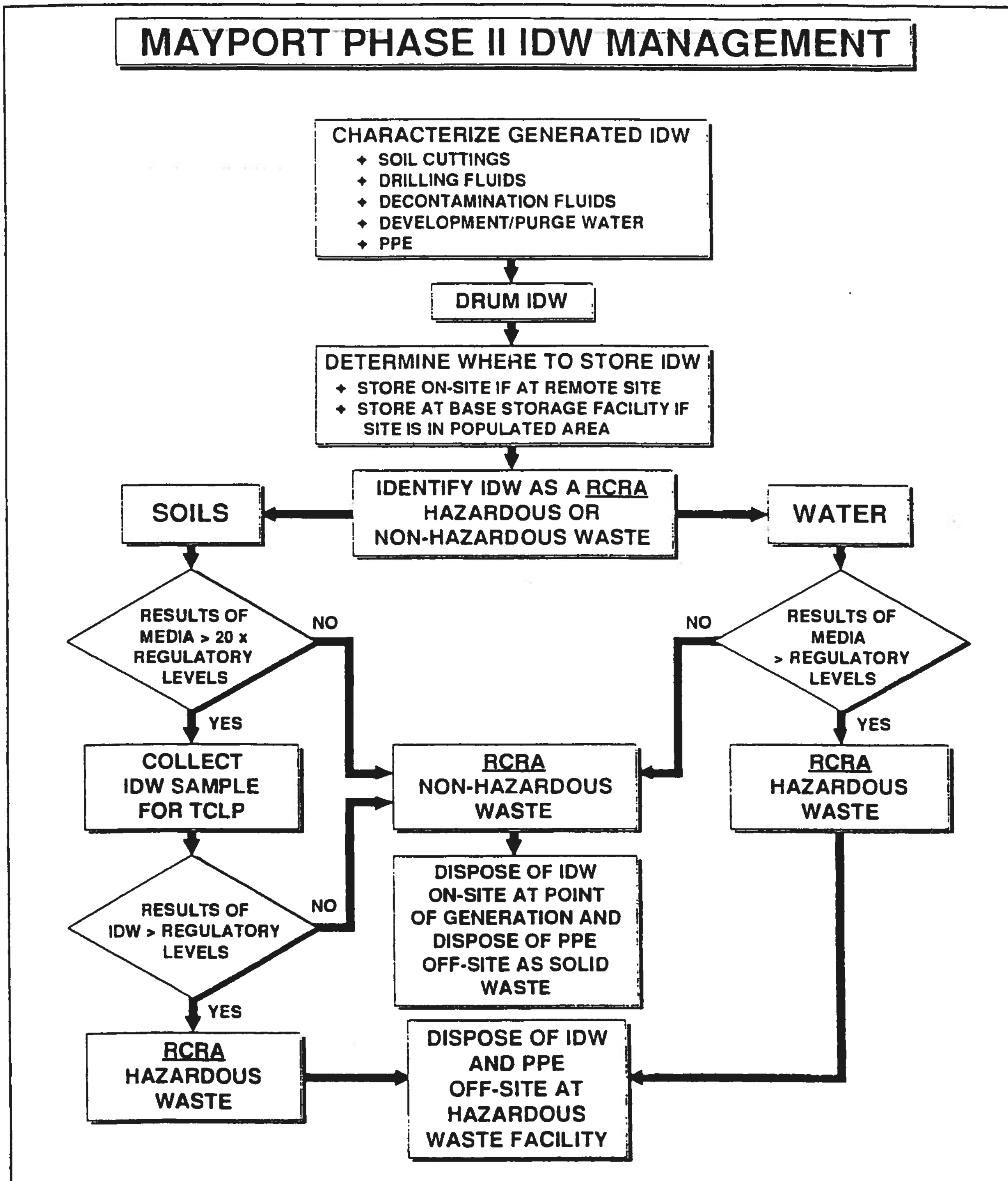

FIGURE 2-1

MAYPORT PHASE II IDW MANAGEMENT

RCRA FACILITY INVESTIGATION WORKPLAN ADDENDUM 1 IDW MANAGEMENT PLAN U.S. NAVAL STATION MAYPORT, FLORIDA

threshold level for any regulated compound, collect a sample of the drummed soil for TCLP analysis.

If the TCLP analysis yields a value greater than the regulatory threshold level for any regulated compound, the soil is an RCRA hazardous waste,

If the TCLP analysis yields a value less than the regulatory threshold level for any regulatory compound, the soil is an RCRA nonhazardous waste.

<u>For water</u>. If results of media samples show greater than the regulatory threshold level for any regulated compound, the water is an RCRA hazardous waste.

If results of sampling show less than the regulatory threshold level for any regulated compound, the water is an RCRA nonhazardous waste.

5. Dispose of IDW appropriately as follows.

<u>For soils</u>. If IDW is identified as an RCRA hazardous waste, dispose of offsite at RCRA treatment, storage, and disposal (TSD) Facility.

If IDW is identified as an RCRA nonhazardous waste, spread soil on ground at point of generation as previously described.

<u>For water</u>. If IDW is identified as an RCRA hazardous waste, dispose of offsite at RCRA TSD Facility.

If IDW is identified as an RCRA nonhazardous waste, pour water on ground near point of generation as previously described.

A summary of the anticipated disposal methods for each type of IDW at each SWMU is presented in Table 2-1. The table is based on the assumption that no IDW will be identified as an RCRA hazardous waste at any of the Phase II SWMUs.

Table 2-1
Anticipated Investigation-Derived Wastes (IDW)[1] and Disposal Methods

NAVSTA Mayport
Mayport, Florida

SWMU	Soil Cuttings	Drilling Fluids	Decontamination Fluids	Development and Purge Water	PPE and DE
6	Spread on ground	Transport to excavation pit.	Discharge to Mayport WWTP.	Pour on ground near well.	Deposit in Mayport dumpster.
7	Spread on ground	Transport to excavation pit.	Discharge to Mayport WWTP.	Pour on ground near well.	Deposit in Mayport dumpster.
8	Spread on ground	Transport to excavation pit.	Discharge to Mayport WWTP.	Pour on ground near well.	Deposit in Mayport dumpster.
9	Spread on ground	Transport to excavation pit.	Discharge to Mayport WWTP.	Pour on ground near well.	Deposit in Mayport dumpster.
10	Spread on ground	Transport to excavation pit.	Discharge to Mayport WWTP.	Pour on ground near well.	Deposit in Mayport dumpster.
11	N/A	N/A	Discharge to Mayport WWTP.	Pour on ground near well.	Deposit in Mayport dumpster.
12	N/A	N/A	Discharge to Mayport WWTP.	Pour on ground near well.	Deposit in Mayport dumpster.
15	Spread on ground	N/A	Discharge to Mayport WWTP.	Pour on ground near well.	Deposit in Mayport dumpster.
16	Spread on ground	N/A	Discharge to Mayport WWTP.	Pour on ground near well.	Deposit in Mayport dumpster.

[1] Assuming non-hazardous IDW at each SWMU.

Notes: SWMU = solid waste management unit.
PPE = personal protection equipment.
DE = disposable equipment.
WWTP = wastewater treatment plant.
N/A = not applicable.

ATTACHMENT A

INDIVIDUAL DRUM TRACKING FORM

ABB ENVIRONMENTAL SERVICES, INC.
INVESTIGATION–DERIVED WASTES (IDW) MANAGEMENT
INDIVIDUAL DRUM TRACKING
NAVAL STATION MAYPORT
MAYPORT, FLORIDA

SOIL BORING / MONITORING WELL I.D.:

PIEZOMETER I.D.:

TOTAL DEPTH:

SOIL DRUM #	DATE	DEPTH INTERVAL	FID/OVA READINGS	VISUAL OBSERVATIONS

'ATER DRUM #	DATE	DEPTH INTERVAL	FID/OVA READINGS	VISUAL OBSERVATIONS

ABB–ES REPRESENTATIVE:

COMMENTS:

DATE:

APPENDIX G

RESPONSE TO COMMENTS

July 20, 1999

4WD-FFB

Ms. Adrienne Wilson
Southern Division
Naval Facilities Engineering Command
P.O. Box 190010
Charleston, South Carolina 29419-9010

SUBJ.: NAVSTA Mayport, Florida
EPA ID# FL9 170 024 260

Dear Ms. Wilson:

The United States Environmental Protection Agency (EPA) has received and reviewed the following document:

- **RCRA Sampling Visit Work Plan for SWMUs 47, 53 and 55** (Tetra Tech NUS, April 1999).

Enclosed are EPA's review comments based on a general technical review as well as a human health and ecological risk assessment review. If you have any questions, please contact me at (404) 562-8555.

Sincerely,

Craig A. Benedikt
Remedial Project Manager
Federal Facilities Branch

Enclosure

cc: Jim Cason, FDEP
Randy Bishop, NAVSTA Mayport
Terry Hansen, TtNUS

EPA Review Comments
RCRA Sampling Visit Work Plan [RCRA SV WP]
Solid Waste Management Units 47, 53, and 55
U.S. Naval Station, Mayport Florida
dated April 1999

SPECIFIC COMMENTS

1. ***Cover Spline, Outside Cover Page and Inside Cover Page****. The cover spline is titled, Draft RCRA Facility Assessment Sampling Visit Workplan SWMUs 47, 53, and 55, Naval Station, Mayport, Florida. The outside cover page is titled, Resource Conservation and Recovery Act Sampling Visit Workplan for Solid Waste Management Units 47, 53, and 55, Naval Station Mayport, Mayport, Florida. The inside cover page is titled, Resource Conservation and Recovery Act Facility Assessment Sampling Visit Workplan, Solid Waste Management Units 47, 53, and 55, U.S. Naval Station, Mayport, Florida. The cover spline, the outside cover page and the inside cover page should all be consistent and be titled exactly the same. This discrepancy in titles should be addressed.*

RESPONSE:

The referenced pages of the report have been corrected to address this comment.

2. ***Page 2-2, Third Paragraph****. The text states, "These sewer lines are all believed to be above the water table, and in general, are approximately 6 feet below land surface (bls)." Since the site is located at the confluence of the St. Johns River and the Atlantic Ocean, it seems that the ground water would most likely be closer to ground surface as opposed to greater than 6 feet. The depth to ground water should be verified prior to beginning field activities and the proposed approach should be modified if necessary.*

RESPONSE:

The depth to groundwater will be verified prior to beginning field activities. If an approach modification is warranted it will be discussed with the Mayport Partnering Team prior to implementation.

3. ***Page 2-6, Section 2.1.2.2****. The text states, "Each monitoring point will consist of 1-inch inside diameter (ID) steel or polyvinyl chloride (PVC) pipe with a 5-foot long 0.010-inch slot screen at the bottom. Each point will be installed in a hole, using DPT, to a depth such that the screened interval spans the depth at which the force main is placed, which in general is expected to be approximately 6 feet bls. Therefore, if the line is actually at 6 feet bls, the bottom of the monitoring point would be placed 2.5 feet below it, at a depth* *of 8.5 feet bls. In some cases the bottom of the point may be below the water table, which is acceptable. However, part of the screened interval must be above the water table to permit retrieval of soil gas samples." As stated in Comment 1, if groundwater is less than 6 feet below ground surface (bgs), then the 5 foot screen monitoring point may be totally submerged below the water table and would not allow the retrieval of soil gas samples or yield representative samples. The proposed sampling method is a concern because of the lack of information on depth to groundwater. Due to the potential that ground water at the facility maybe very shallow, there is a good possibility that the proposed approach for assessing the underground pipelines is unfeasible. The depth to groundwater should be verified and, if necessary, a different approach for verifying potential releases should be proposed. The work plan proposes 480 monitoring points; however, this number appears excessive given the level of effort usually associated with this type of investigation. The need for 480 monitoring points should be reevaluated.*

RESPONSE:

Based upon the results of the data presented in the Group IV Sampling Event report submitted by HLA in March 1999, soil gas testing has been omitted from the Group IV Workplan. The revised workplan proposes the installation of approximately 150 soil borings and 30 monitoring wells, locations to be chosen based on results of historical investigations.

4. ***Page 2-15, Third Paragraph***. *The text states, "Terraprobe borings are self-healing and do not require grouting upon completion." This statement requires further explanation. The text should provide by what process these boring will "self-heal". The text further states that pumping will continue until the turbidity is below 5 NTUs or until the field operation leader believes further pumping will not significantly decrease the turbidity. According to the Region 4 SOP, pumping should continue until turbidity is below 5 NTUs or until field parameters stabilize (temperature, pH, and conductivity).*

RESPONSE:

The workplan text on Terraprobe sampling was revised to state: "If necessary, the Terraprobe borings will be grouted upon completion."

The workplan text on groundwater sampling was revised to state: "The temporary sampling point will be pumped until temperature, specific conductance, and pH have stabilized and until the turbidity is below 5 NTUs."

5. ***Page 2-16, First Paragraph***. *The text states, "Volatile organic compounds (VOCs) will be collected last for samples submitted for laboratory analyses." According to EPA protocol, VOCs should be collected first instead of last. The text should be changed to reflect this procedure. The text further states that VOCs are used to screen samples*

because the presence of inorganic contaminants is not expected without the presence of volatile organic contaminants. This statement should be explained.

RESPONSE:

The text was revised to state: "...VOCs will be collected first for samples submitted to laboratory analysis." The statement regarding VOCs and the presence of inorganic contaminants has been deleted.

The following comments relate to the human health and ecological risk review:

GENERAL COMMENTS

6. *According to the Sampling Visit Work Plan (SVWP), surface water and/or sediment from Mayport Turning Basin are not being sampled. It is unclear as to why surface water and sediment are not being sampled from this site. According to the Chapter 2 figures, Mayport Turning Basin is very close to SWMUs 47, 53, and 55 and migration of contaminants via surface water runoff; storm water discharge and groundwater discharge to the Turning Basin seems highly possible. Surface water and sediment contamination may be occurring in Mayport Turning Basin and should therefore be sampled and analyzed during the Sampling Visit. If this is not the case it should be explained why in the SVWP.*

RESPONSE:

A similar question was asked on the AOC C workplan for Mayport Florida. The same response is provided here.

Although potential chemical migration from AOC C (and these SWMUs) to the Turning Point Basin will be investigated in this study and addressed in the uncertainties section of the risk assessment portion of the report; surface water and sediment risk assessment is beyond the scope of this ERA. This is primarily because the basin is dredged every 2 to 3 years for safe berthing of Navy ships. Dredged sediments are transferred through a slurry pipeline to SWMU 50, the Western Dredge Spoil area. Data from any surface water or sediment samples that would be collected for this study, and subsequent evaluation of ecological risks, would be unusable the next time the basin is dredged.

7. *Figures 2-1, 2-2, and 2-3 show maps of SWMUs 47, 53, and 55, respectively. The figures show a map of the Naval Station Mayport with dashed lines representing pipelines, sewers, or drainage ditches. However, the figures do not show the direction of flow in these pipelines, sewers, or drainage ditches. Direction of flow of all pipelines, sewers, drainage ditches as well as groundwater flow direction should be marked on each of the appropriate Chapter 2 figures.*

RESPONSE:

The flow direction information will be verified prior to the beginning of field activities, and indicated on figures presented in the report of the investigation.

8. *It is stated in Chapter 4 that environmental samples will be compared to a number of benchmark screening values during the preliminary risk screening process. Soil results will be compared to human health benchmarks while surface water and sediment samples will be compared to ecological benchmarks from 1991, 1993, and 1994. It should be noted, however, that more recent ecological screening values (1998) have been released by EPA Region IV. In a December 22, 1998 memo from Ted W. Simon, a toxicologist for the USEPA Region IV Office of Technical Services, new surface soil guidelines for Region IV are introduced. Included in the memo are updated sediment and surface water screening values. These newly issued Region IV ecological screening values should be used in the preliminary risk screening process. The SVWP should be changed to state that these values will be used. In addition, the ecological screening process should follow the guidance presented in this memo for implementing USEPA's 1997 Process for Designing and Conducting Ecological Risk Assessments document. Dr. Simon's memo can be found at:* http://www.epa.gov/region4/wastepgs/oftecser/otsguid.htm

RESPONSE:

The Work Plan will be modified to indicate that Region IV ecological screening levels presented in the December 22, 1998 memorandum will be used in the ERA.

SPECIFIC COMMENTS

9. ***Section 2.1.2.3, Page 2-7****. This section describes the environmental sampling proposed for SWMU 47. The environmental sampling to be performed at this site is direct push technology (DPT) sampling. It is unclear what environmental media will be sampled using this technique. Although a detailed discussion of the DPT system was presented in the original work plan, the system should be better explained in Section 2.1.2.3 of this work plan so it is clear what environmental media will be sampled at SWMU 47.*

RESPONSE:

The text was revised to state: "...DPT sampling or equivalent technology will be used to evaluate whether oily waste has been released to the surrounding soil."

10. ***Section 2.2.2.3, Page 2-14****. This section describes the environmental sampling proposed for SWMU 53. According to Figure 2-2, a sanitary sewer line runs along Moale Avenue, which is very close to Lake Wonder Wood. If leaks are found along this sewer line, there is the possibility that contamination could be migrating into Lake Wonder Wood. Therefore, it is recommended that surface water and sediment samples from Lake*

Wonder Wood be included in the environmental sampling event at SWMU 53.

RESPONSE:

ABB Environmental Services (ABB-ES) sampled Lake Wonderwood sediment and surface water in 1993 (*Sediment and Surface Water Sampling and Analytical Results, Lake Wonderwood Area, U.S. Naval Station, Mayport, Florida,* ABB-ES, December 12, 1996). The results of this investigation warranted no further action, therefore Lake Wonderwood sampling will not be included in the Group IV investigation.

11. ***Section 2.2.2.3, Page 2-14****. It is stated in the last sentence of the first paragraph of Section 2.2.2.3 that soil and groundwater sampling procedures will be those outlined in Appendix C of this work plan. According to the table of contents, there is no Appendix C in this work plan. If sampling procedures are located in an appendix from another document, it should be stated in this sentence. This discrepancy should be corrected as appropriate.*

RESPONSE:

Appendix C has been added to the Table of Contents and the appropriate text relocated.